the OIL AND GAS JOURNAL
PUBLISHED WEEKLY FEBRUARY 8, 1960

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Why drilling is getting a slow start ▸ 60

Sinclair tells some research findings in . . .
Thermal recovery, new exploration tools, and plugging of channels in water floods ▸ 62

New series: How to reduce drilling costs ▸ 92

Exploration's role in new oil era ▸ 158

What Pipeliners Heard at Los Angeles

- What's ahead in oil and gas
- What's ahead in construction
- Pitfalls and how to avoid them

A Special Report ... p. 78

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OIL AND GAS JOURNAL
Vol. 58 No. 6

Contents February 8, 1960

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Annual index available on request.

TECHNOLOGY—OPERATION

SPECIAL REPORT: WHAT PIPELINE CONTRACTORS HEARD AT LOS ANGELES 78-85

1960 To Be Good Year for Pipeline Construction 78

The outlook is for a high volume of work, but keen competition may cut profit margins to dangerously small levels. Footage prices are expected to remain steady or even to be reduced, in the face of rising costs. The past year saw more than 10,000 miles of construction, with a dollar volume of 149 million.

Avoiding Pipeline-Construction Pitfalls 82

By A. N. Horne

This can be done if both contractor and pipeline owner are fair minded; if the contractor reads the specifications, studies the job, and exercises good judgment; if both understand each other before the job starts; and if both are lucky.

Refining-Processing

Process-Automation Instruments Now Are Dependable 86

By Porter Hart

Electronic control systems are more reliable. Analog computer, digital computer, and process-stream analyzer are available for use, depending on economics.

Processing Feed Stocks for Cat Cracking 89

By K. K. McMillin

Humble's system has increased production of premium and regular grades of gasoline and of petrochemical raw stock. Treating costs of cracked products have been minimized and sulfur corrosion in downstream processing has been reduced.

The Foreman's Page 104

Pressure principles demonstrated.

Here's An Easy Approach to Centrifugal-Compressor Selection 107

By Sherman L. Cole

The method is based on five charts and graphs. Using the appropriate chart and simply plugging in pertinent data will result in an answer ample for first approximation studies.

Electronic Instrumentation Finds Favor at Anchor's Tabasco Plant .. 115

By Harry R. Marsh

Major advantages for this gasoline-plant installation are elimination of signal lag and infinite sensitivity. The system offers centralized control from one location, thereby requiring only one operator per shift. Plant operation has been smoother, and startups and shutdowns have been made faster.

ROW Plant Typifies Germany's Petrochemical Progress 121

Investment in this Ludwigshafen plant will reach $70,000,000 by 1961. The German petrochemical industry is now fourth-largest in the world.

Questions on Technology 122

Can small refiner afford a research department? What are average tanker rates?

Drilling

How to Reduce Drilling Costs 92

By Preston L. Moore

The start of a new Journal series on drilling practices and how these practices affect well costs. The effect of reducing initial well costs on annual profits is shown in this installment.

Here's a Handy Header for a Butane Line 93

Production

How to Get a Million Dollars from an Abandoned Oil Lease 94

By K. Davison and R. L. Shick

Starting with an abandoned field in Lawrence County, Illinois, that had produced nearly 40 years, Tekoil Corp. started water flooding in three different formations to produce more than a third of a million barrels of secondary-recovery oil in 7 years. Present production and injection wells were fracture treated.

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Feb. 8, 1960

Oil conspiracy trial may be shorter than expected:

Government is getting its case into shape fast, thanks to pretrial conferences, stipulations, and special trial rules adopted by both sides.

It's been a documentary trial thus far.

Parade of witnesses wil feature this week's proceedings.

Antitrusters even may wind up their case by end of week.

Concern of major executives: Their traditional ways of doing business are under attack, may cause a sharp change if Government wins the case (p. 56).*

▼ ▼ ▼

Active rotary rigs are down sharply because of:

Low per-well income...Tight money...The time of year... Adjustments in drilling programs.

That's what oil executives tell the Journal and they predict the industry still will have a fair year despite the 13-year low in drilling activity (p. 60).

▼ ▼ ▼

Final plans are being worked out to enable the industry to help supply the Government with necessary oil information, statistics, and consultation. This appears to be the shape it is taking:

...A readiness subcommittee will be appointed from the membership of an expanded Foreign Petroleum Supply Committee. However, it will have different duties and will work entirely independently of the parent committee. Primarily, it will assess oil capabilities, damage loss, retaliation, etc., likely to result, on a world-wide basis, from military assumptions by the Defense Department.

...The FPSC itself will act in a fact-finding role, supplying statistics and analysis of current and future developments in the petroleum industry. Although it will include domestic as well as foreign figures, it will not have access to individual company figures.

...Representatives of other governments will be able to

---

*Refers to article in this issue giving more details. Where no page is given, the item is a Newsletter exclusive.

participate as observers, thus providing a channel for the flow of data into the FPSC from non-American oil companies.

▼ ▼ ▼

A pilot hot-water flood is planned for a small tar-zone pool in California's Wilmington field.

Portions of the zone already are under flood as part of the 1,000,000-bbl.-daily project designed to stop land subsidence.

The Long Beach Harbor Department wants to learn if the hot water won't increase the recoveries of the low gravity, highly viscous crude.

Computers have outstripped ability of operators to make use of them, but this won't limit growth of instrumentation in the oil industry.

That's word of computer experts who held convention in Houston last week. They look for single-purpose computers to be used more and more. These are designed to control only one process (p. 73).

▼ ▼ ▼

Signs of a split in ranks of Venezuela's ruling party over oil policy may be appearing.

Dr. Juan Pablo Perez Alfonso, minister of mines and hydrocarbons, continues to advocate depressed production—even below the 2,500,000-bbl.-daily mark. He doesn't care if Venezuela loses its position in world markets.

Domingo Alberto Rangel, a party deputy who regards himself as an authority on Venezuelan economy, last week wrote "a new oil policy" in which he urges an aggressive policy to keep Venezuela's place in world markets.

His reasoning: Venezuela doesn't need to hoard its oil reserves. It should invest the income from oil in development of the country.

Venezuelan exploration, which dipped pretty sharply last year, won't pick up in 1960. Activity probably will drop even more.

Companies operating in Venezuela under the country's increased tax bite and under oil policy aimed at a depressed rather than rising production curve, are moving carefully.

Operators plan only 62 months of surface-party work and 13 of seismic for 1960. This compares with 207 months in 1959.

Wildcatting will feel the pinch, too. Companies plan only 65 exploration wells this year, compared to 120 in 1959.

Venezuelan business men are urging the government to take it easy on the oil industry.

The Caracas Chamber of Commerce has recommended the

government follow a prudent policy toward the industry in order not to affect oil production costs which would weaken its competitive position in world markets.

The chamber based its views on these facts: Growing imports by Europe from the Middle East and North Africa, increased shipments of Russian oil to Latin America, the world surplus producing potential, and competition from other fuels.

▼ ▼ ▼

The imports issue:

Canadian Energy Board hears that California is counting on gas imports from Canada to help meet its enormous future fuel demands (p. 68).

Oil Import Administration in Washington is facing its first stern tests in appeals of companies asking alterations in their quotas (p. 66).

Licensed imports of crude, unfinished oils, and residual fuel oil into the U. S. and Puerto Rico totaled 1,436,123 bbl. daily during the last half of 1959.

This does not include 101,184 bbl. daily of exempt crude from Canada. In each import category, imports were slightly less than allowables set by the Government.

▼ ▼ ▼

New crude pipeline for North Dakota is possible.

Matador Pipe Line Corp. has application pending before Canadian parliament for 175-mile line to be started this spring. It would carry crude from North Dakota to the Cromer junction with Interprovincial Pipeline (p. 68).

Other Canadian notes:

Canadian oil men had a record year in 1959 despite their continuous market troubles.

Production of petroleum liquids averaged 518,895 bbl. daily, up 12% over 1958. Output of 600,000 bbl. daily is expected to be achieved this year.

Mood in natural gas is even more bullish. Production last year averaged 1,297,087 M.c.f. daily, about 200,000 M.c.f. more than the year before. With gas export proposals currently hanging fire, the lid could be taken off gas production before the year is out.

Petrochemical production is booming in Canada. Output should reach 4.5 billion pounds by 1965, double the production in 1958.

Imported cars took 26.4% of the Canadian market in 1959 up from 19.7% in 1958. Such a swing will make itself felt in the regular-premium ratio of Canadian gasoline sales.

Sinclair and Koppers wil team up on a new petrochemical plant at Houston designed to produce styrene monomer.

Completion date is mid-1961. Capacity is 70 million lbs. per year. Facility will separate ethylbenzene from an aromatic stream at Sinclair's Houston refinery. Ethylbenzene is then converted to styrene monomer by dehydrogenation.

It's another example of raw-material producer teaming with a marketer in new petrochemical venture. It's also part of new thinking at Sinclair which is putting extreme emphasis on research (p. 62).

Styrene overcapacity predicted last year failed to develop. Instead, a possible shortage is in the offing.

Big factor in this capacity-production reversal has been the polystyrene price cut in 1957. This opened the door for increased use of polystyrene resins that showed up last year in manufacture of household wares, toys, appliances, autos, and packaging. This long has been the major market for styrene followed by synthetic rubber production.

Some present producers already plan additional styrene-monomer capacity and they will be joined by several newcomers such as Amoco, El Paso Natural Gas, and possibly Shell.

▼ ▼ ▼

Regular brands should increase their share of gasoline sales in the next few years, according to Shell estimates.
Reason: Growing number of small and compact cars.

Shell's estimate: Regular will account for 70% of all service station sales by 1964 against 57% in 1959.

The compacts are in a horsepower race, however, and this will put more pressure on regular-grade gasoline.

Corvair started it by coming out with a 95-hp. option, 15 above its basic engine. Valiant then announced a 145-hp. option, an increase from its standard 101-hp. Rambler put out a new 125-hp. engine for its American, up from 90. Now Ford plans a 100-hp. Falcon.

▼ ▼ ▼

Around the industry:

Arctic Circle play this year will feature a dozen rigs expected to drill 30 holes in Canada's Far North.

Vickers will move into the Nebraska-Iowa marketing territory with division headquarters at Omaha.

Selected steel prices will rise about 3.9% during first half of the year, private survey indicates.

New dimension has been added to polyethylene packaging films and moulded items—aroma.

Gasoline prices are up one-fourth cent in Mid-Continent and are firming on the Gulf Coast. No. 2 and middle distillates are off one-fourth on the Gulf and East Coast.

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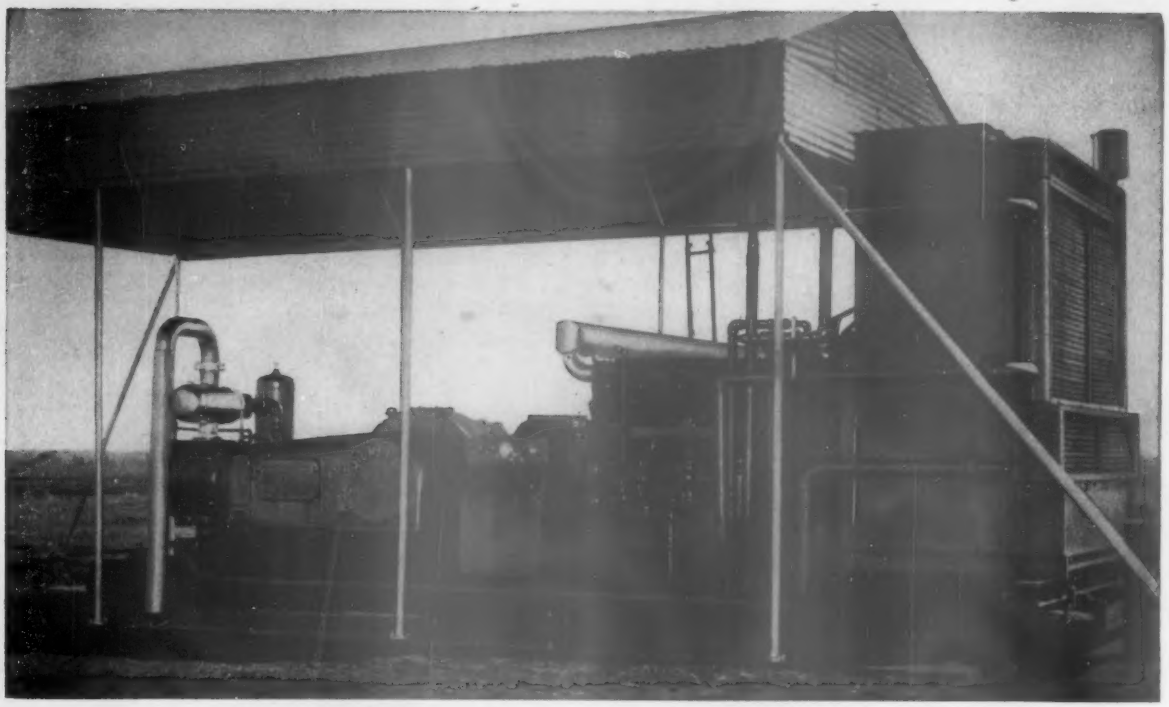

This "Oilwell" DGE 300 Compressor is a two-stage unit in a gas-lift operation, and can handle up to 3,160,000 cu. ft. of gas per day at 400 psig intake and 1,500 psig discharge pressures.

Pumping gas?

See the advantages you get with "Oilwell" DGE Compressors

In this popular DGE line, dual compressor units are mounted side by side and powered by a single prime mover through direct-connected, right-angle spiral gearing. Updraft radiator, with separate compartments for cooling engine, compressor cylinders and interstage gas . . . together with control panel and all inter-unit piping . . . are all compactly mounted on a heavy-duty, structural steel skid base. Consequently, these units are completely portable and ready for service as soon as they are installed.

Compressors are slow-speed, horizontal type—top-suction and bottom-discharge. Slow speed operation results in minimum wear on moving parts and corresponding low maintenance costs. All vital parts are enclosed.

DGE Units are available in 125 hp up to 300 hp sizes . . . and can be furnished for single or multistage compression. They have proven their superiority for many well-known companies in . . . gas-gathering operations . . . gas transmission to main distribution systems . . . pressure maintenance programs . . . recycling of natural gas . . . oil production using gas-lift . . . underground gas storage . . . and gasoline plant, refinery and petrochemical plant operations.

That's why we urge you to contact your nearest "Oilwell" store, or write COMPRESSOR DEPARTMENT, Oil Well Supply, Dallas 21, Texas . . . and get specific information on a DGE unit for every gas-pumping problem within this size range.

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B.F.Goodrich

B.F.Goodrich hose still on rig after 2½ years, 200,000 feet

THE B.F.Goodrich rotary drilling hose hanging on that rig gets rough treatment both inside and out. Its cover scrapes against the derrick, is exposed to extremes in weather. Abrasive, oily mud rushes through it. Abuse like this caused the previous hose to wear out in a year. But after 2½ years and 200,000 feet of hole, the B.F.Goodrich hose is still going strong, hasn't caused a minute of downtime for maintenance.

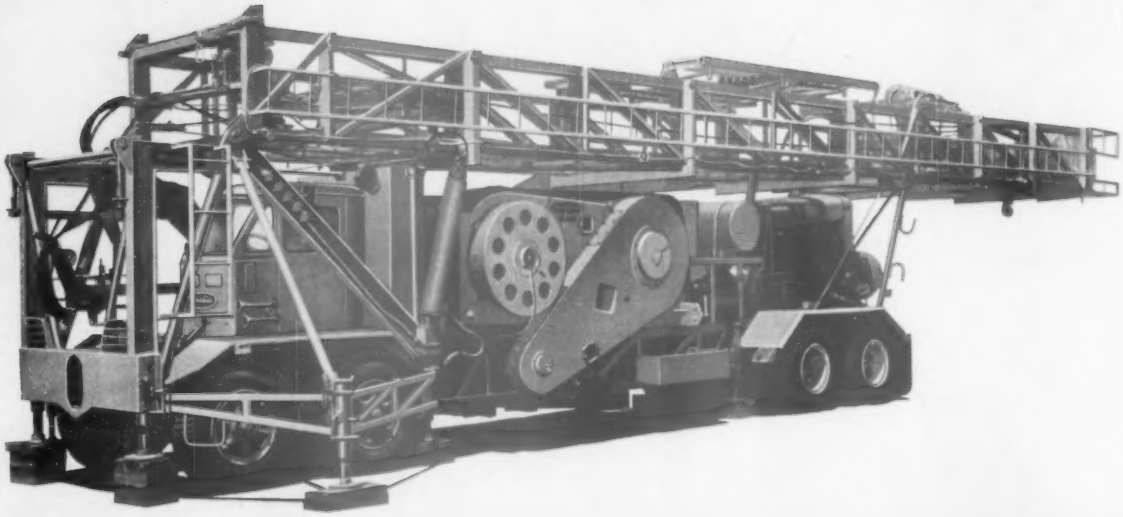
This B.F.Goodrich hose, called "Highflex", has a thick, tough cover that stands more punishment, lasts longer on the rig. It resists gouges, scrapes and tears. Sun, wind and rain won't weaken it. Oily mud will not cause swelling or rotting of the tube.

Highflex hose is also built to take extreme bottom hole pressures. Spiral-wrapped cable wires used for reinforcement make it burst-resistant, qualify it for Grade C (5000 lbs. test pressure) American Petroleum Institute. Hose ends are reinforced with additional plies of wire and fabric to protect against bending stress, prevent hose blowouts at the coupling.

Strong as it is, B.F.Goodrich Highflex is also the most flexible hose made for heavy duty service. It's easy to attach to the rig, hangs well from the standpipe, coils easily without kinking.

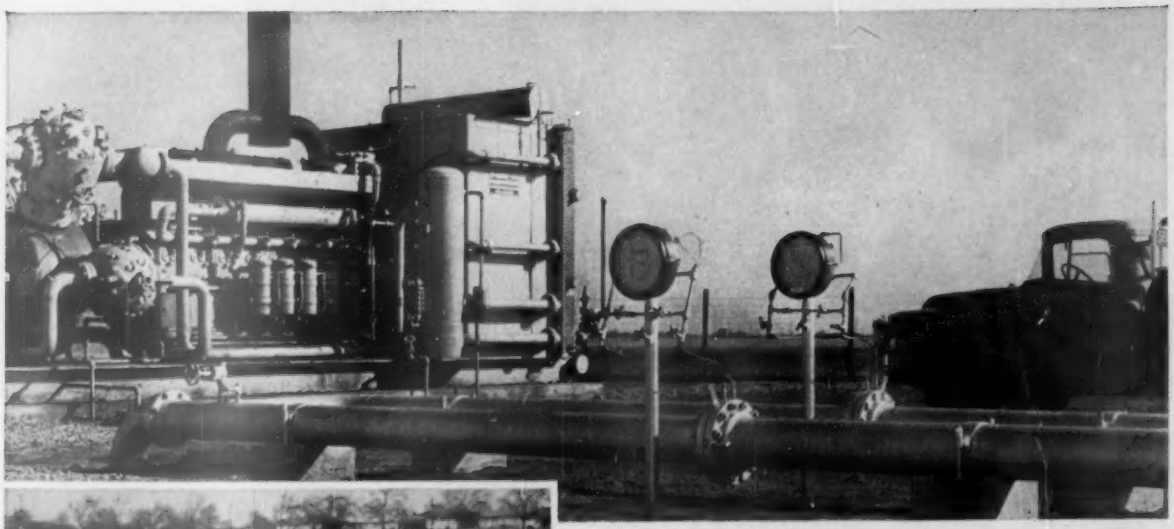
You'll find B.F.Goodrich Highflex hose at leading supply stores in the oil field, or at any of these B.F.Goodrich warehouses: Los Angeles, Great Bend, New Orleans, Shreveport, Hobbs, Oklahoma City, Tulsa, Corpus Christi, Dallas, Houston, Kilgore, Odessa, Wichita Falls. *B.F.Goodrich Industrial Products Company, Department M-790, Akron 18, Ohio.*

B.F.Goodrich *rotary drilling hose*



KM250

cardwell



Foxboro Diaphragm Meters on gas well head measurements at Sunray Mid-Continent's Moore, Oklahoma field. Meters return to zero instantly when flow stops — have no ambient temperature effects, even though temperatures have ranged from −8°F to +105°F.

"the only dry meter with the solid pen-power of a mercury meter"

. . . reports H. H. (Pat) Everett
Sunray Mid-Continent Oil Co.

Fastest zero return of any dry meter on intermittent gas flows. That's just one reason why Sunray Mid-Continent Oil Co. finds the Foxboro Type 37 Diaphragm Meter perfect for gas wellhead flow measurements.

Sunray currently has 47 Diaphragm Meters in operation on gas separator and compressor stations in the Oklahoma City district, with 13 more due to be installed shortly.

District Superintendent H. H. (Pat) Everett also reports that his Diaphragm Meters have never needed calibration since they were installed. And they're completely free from zero drift and ambient temperature effects . . . resulting in the highest sustained accuracy of mercury-less gas flow measurement. No wonder Sunray says the Type 37 outperforms all other dry flow meters!

You'll find Foxboro Diaphragm Meters provide highly accurate, dependable records of all gas flow measurements. Get full details from your nearby Foxboro Field Engineer, or write for Bulletin 7-15A. The Foxboro Company, 602 Neponset Ave., Foxboro, Massachusetts.

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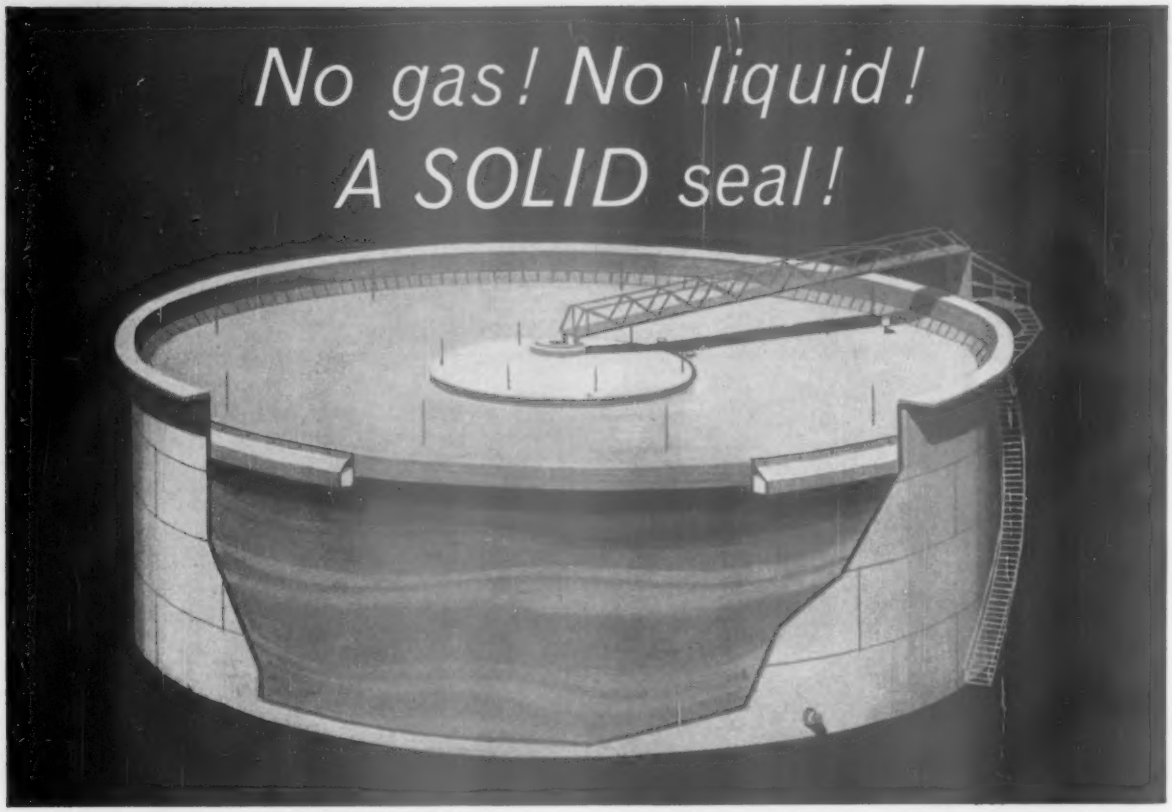

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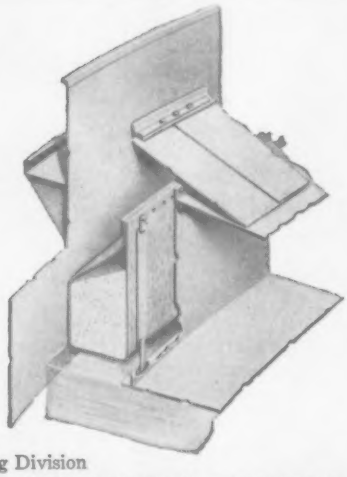

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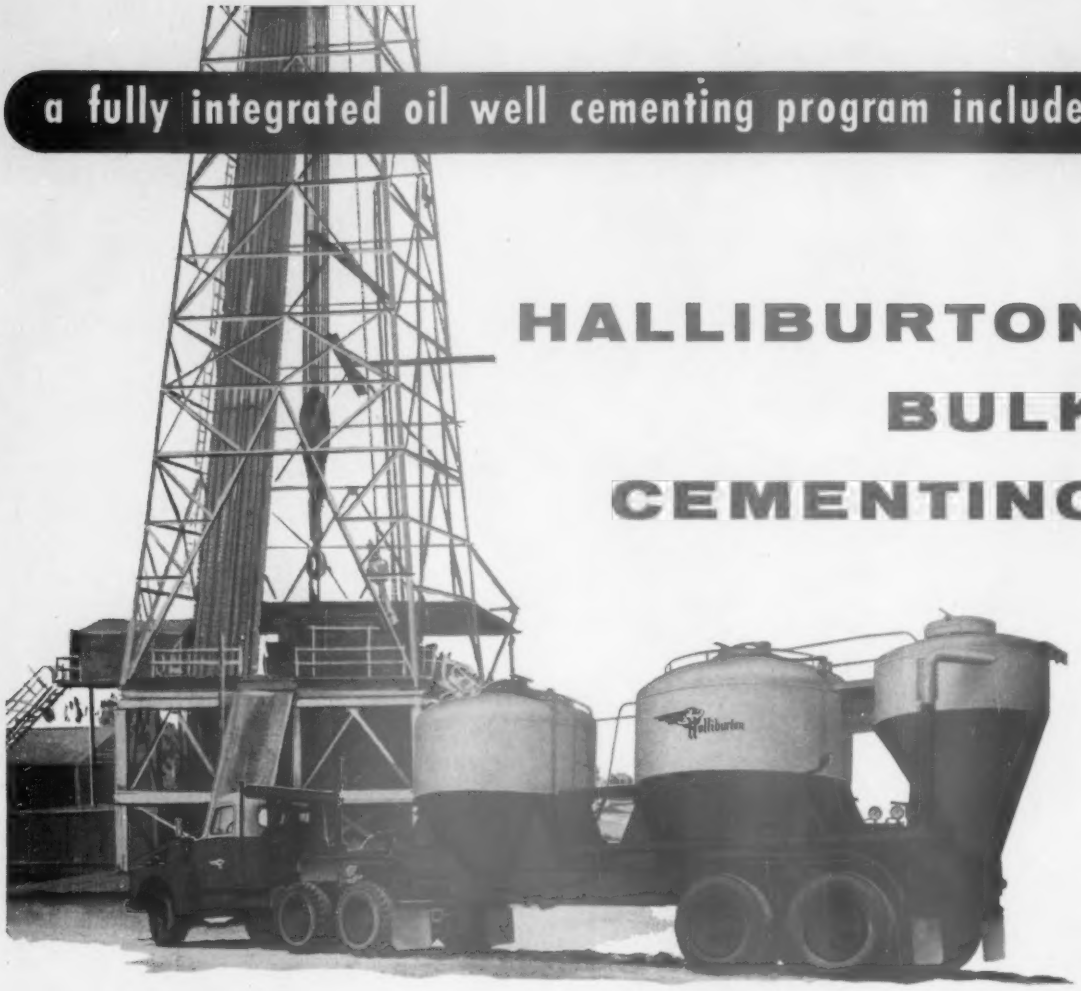

Bulk cementing, first introduced to the oil industry by Halliburton in 1940, represents another Halliburton development for better oil well cementing. The advantages and benefits of the original bulk cementing materials, equipment and techniques have been augmented through a continuous program of sustained improvement in bulk services... and have received enthusiastic approval of operators in all oil-producing areas.

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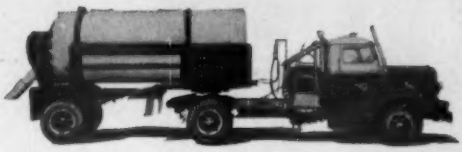
THESE HALLIBURTON CEMENTS AND ADDITIVES BOOST THE BENEFITS OF HALLIBURTON BULK CEMENTING



POZMIX CEMENT...POZMIX 140

Pozzolanic cements help provide maximum oil well protection against corrosion, contamination, and ineffective bonding between pipe and formation. Pozmix Cement, a blend of Pozmix and portland cement, is designed for wells of moderate temperature; Pozmix 140, a blend of Pozmix with hydrated lime, is designed to obtain long pumpability and strength stability in wells where temperatures range from 140°F to 400°F+. Both Pozmix Cement and Pozmix 140 may be used with chemical additives, such as retarders, accelerators and low fluid loss agents, for better control during the cementing operation.

HI-DENSE NO. 2

This high specific gravity material (4.7) has a graded particle size requiring minimum water for wetting. These two factors make it possible to increase the density of cement slurries to 20 pounds per gallon, yet maintain adequate pumpability without the sacrifice of strength. Due to the lower water requirements, relatively small quantities of Hi-Dense are required to obtain the desired weight and the increased ratio of solids to the mixing water imparting greater strength to the set cement. Since Hi-Dense is completely inert and has very little effect on the composition's physical properties, it can be used with Pozmix, Pozmix 140, portland or retarded cements.

GILSONITE CEMENT

A new granular additive for all types of cementing compositions, with excellent lost circulation control characteristics through reduction of slurry density and outstanding bridging ability. With a specific gravity of 1.07, Gilsonite adds volume, *not* weight, to cement slurry, resulting in light weight slurries having high compressive strength at low temperatures . . . Resistant to water and brine corrosion and to attacks of acids or alkalies; has a high insulating value against electric currents.

LATEX CEMENT

Halliburton Latex Cement is a low fluid loss composition recommended for primary casing cement, "tailing-in" on a primary cementing job, squeeze cementing and cementing liners. This slurry may be accelerated or retarded without altering the low fluid loss properties.

Perforating tests indicate twice the bullet penetration in Latex Cement, with very little shattering, as compared to portland cement. Halliburton Latex Cement is also highly resistant to mud contamination.

HA-5 ACCELERATOR

HA-5 is an improved accelerator for oil well cementing slurries to be used for surface pipe or shallow wells. Higher compressive strengths at early ages are obtained, sometimes permitting W.O.C. times as short as four hours on surface pipe temperatures of approximately 80°F.

SALT WATER CEMENT

This is a dual functioning additive that retards the set of portland or Pozmix Cement and improves the bonding qualities to salt formations. Blending granulated salt and dry cement eliminates foaming and time lost in dissolving salt in water prior to mixing with cement.

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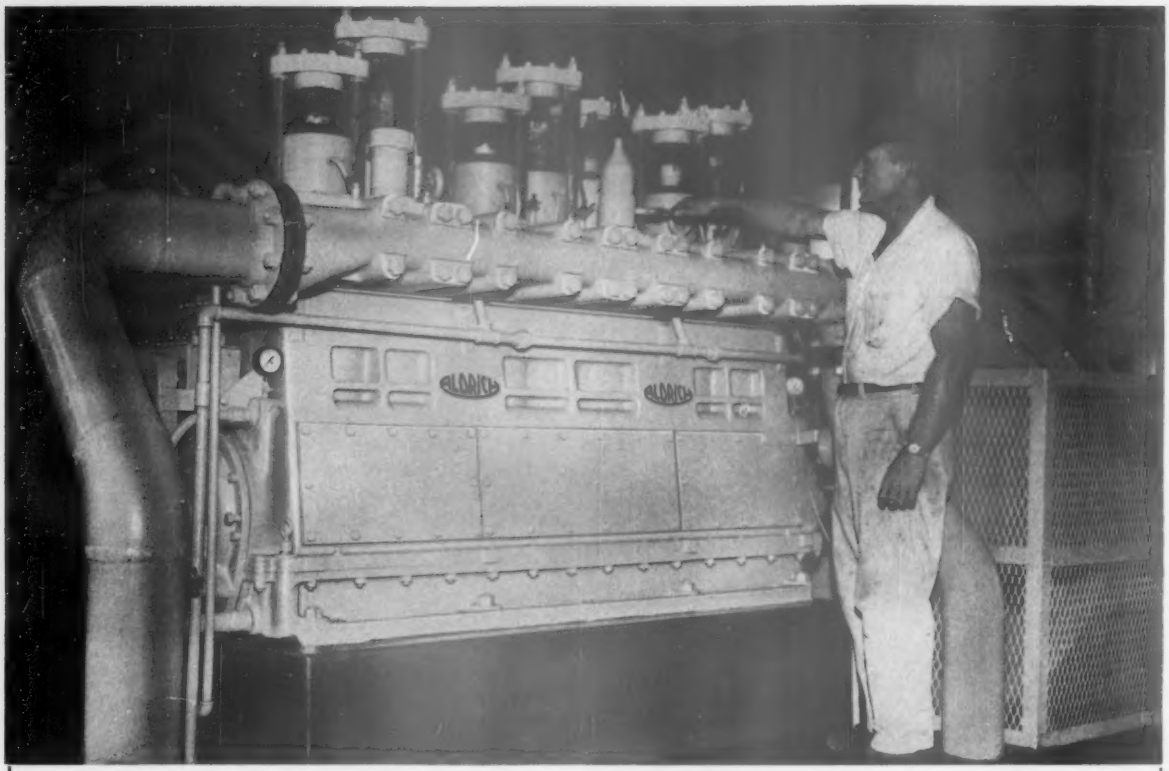


FIELD REPORT

FLOOD: Pegasus Unit

OPERATOR: Mobil Oil Company

PUMPS: Two Aldrich Septuplex

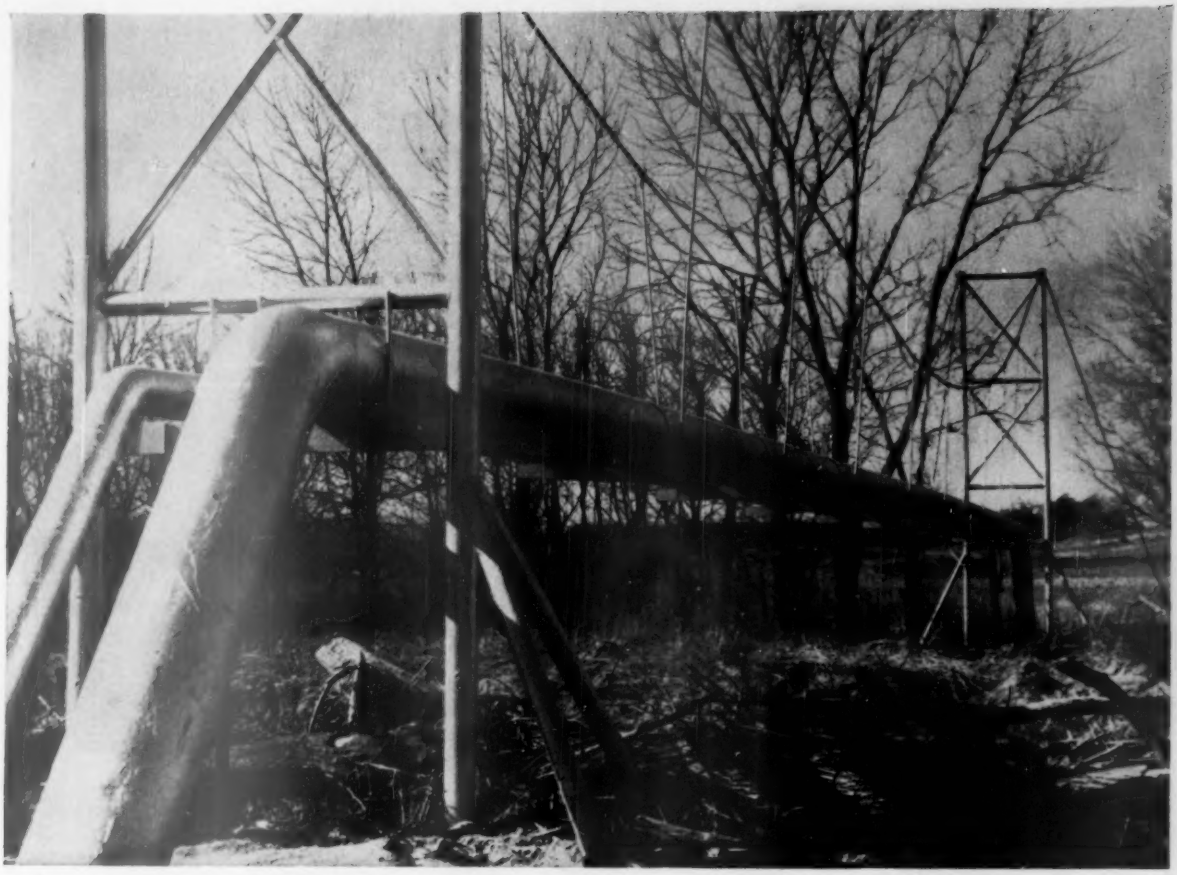
FLOODING STARTED: February, 1955

EXPERIENCE TO DATE:

Pumps continuously deliver brine to two formations — 90 gpm at 2,500 psi; 150 gpm at 1,000 psi. Customer reports: "Routine maintenance only. Aldrich pumps were selected because of previous dependable and economical service under high pressure operations."

Field parts stock available in Carmi, Ill.; Calgary; Casper, Wyoming; Charleston, W. Va.; Houston; Los Angeles; Odessa and Tulsa. For further information, write the ALDRICH PUMP COMPANY, 9 Gordon Street, Allentown, Pa.

the toughest pumping problems go to ALDRICH



Don't Pay for "Extra" Steel— Specify Armco Line Pipe

New steels are born at Armco

Suppose you are planning a pipe line that calls for 16-inch-diameter steel pipe with .172-inch minimum wall thickness. There is no need for you to settle for the .250-inch thickness available from most suppliers. Armco has 132 different diameter wall thicknesses, enabling you to meet your requirements *exactly* . . . without buying "surplus" steel.

Armco Pipe is supplied in lengths up to 50 feet instead of the ordinary 40-foot or double-random lengths. The longer lengths mean fewer field joints—you save welding and handling time.

Get complete details. Send us the coupon below for a copy of Armco's Welded Steel Pipe Catalog for the Oil and Gas Industries. Armco Drainage & Metal Products, Inc., 4570 Curtis Street, Middletown, Ohio.

ARMCO DRAINAGE & METAL PRODUCTS, INC.
4570 Curtis Street, Middletown, Ohio

Send me the Welded Steel Pipe Catalog for the Oil and Gas Industries.

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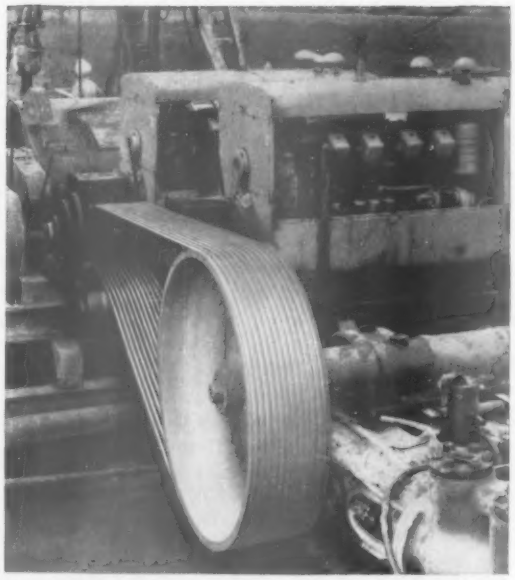
Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company • The Armco International Corporation • Union Wire Rope Corporation

- **Extreme Length Stability**
- **Eliminates Matching Problems**
- **Controlled Elasticity**
- **Greatest Over-All Strength**
- **New Super Strength Cords**
- **Oil and Heat Resistant***
- **Static Dissipating***

***Super-Thorobred V-Belts**



Shale Shaker to Slush Pumps
There's a Dayton Blue Ribbon Thorobred or Super-Thorobred V-Belt to "trouble-proof" your operation. Super-Thorobreds are especially designed to meet oil field requirements. They effectively resist oil, weathering, abrasion and are static dissipating.

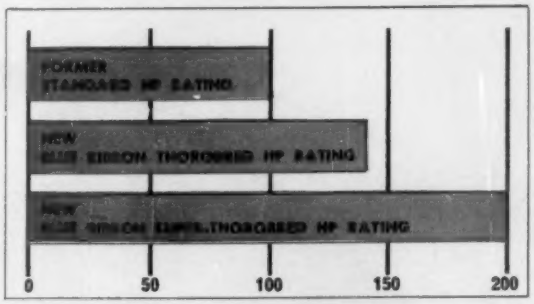
The leader in V-Belt development announces a complete ***NEW*** *line—*

Dayton BLUE RIBBON V-Belts

with important new gains in ***Thorobred*** *and* ***Super-Thorobred*** *horsepower capacity*

When you have to increase production, reduce downtime and cut costs all at the same time, the new name to remember in V-Belts is Dayton **Blue Ribbon** . . . not a redesigned V-Belt line, but a completely new approach to power transmission that only Dayton V-Belt engineers could produce.

Everything's new—from the selection of rubber stocks in the compression and tension sections to the "controllable" synthetic fibres in the strength section and the double-wrapped "High Twist" bias-cut cover that's applied relaxed for maximum give during bending. These exclusive new features give you the best all-around V-Belt line on the market today . . . at budget costs.

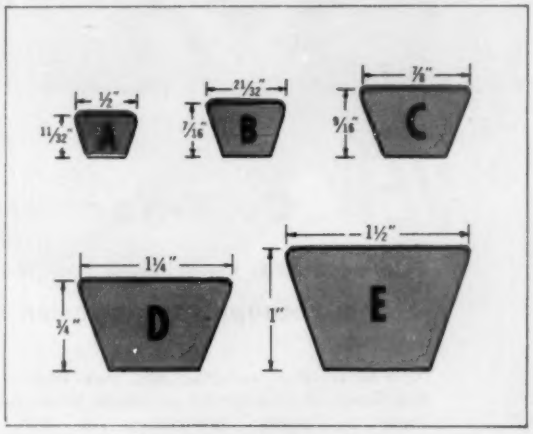


New Blue Ribbon Thorobred ratings are 40% higher than previous standard belt ratings.

New Blue Ribbon Super-Thorobred ratings are now 70% to 120% higher than previous standard belt ratings.

New Dayton *Blue Ribbon* V-Belts cut costs five ways:

1. **Prolong machine life.** Blue Ribbon Belts absorb machine killing shock loads and vibration . . . protect valuable production equipment.
2. **Reduce inventory.** Now, belts can be ordered singly or in perfectly matched sets by number alone. Each belt carries its share of the load for longer life and fewer replacements.
3. **Wider operating range.** Your present sheaves now offer a much greater range of horsepower capacities. No special sheaves required.
4. **Improved efficiency.** Blue Ribbon Belts operate at less tension, thereby increasing bearing life.
5. **Increase production.** Long Belt life means less downtime for replacement.



Blue Ribbon V-Belts are available in a full range of industry standard sizes.

Thorobred—A through E cross-section

Super-Thorobred—A through C cross-section

FOR MORE INFORMATION SEE YOUR YELLOW PAGES UNDER "BELTING" OR WRITE TO:

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Dayton Industrial Products Co.

Melrose Park, Ill.
A Division of The Dayton Rubber Co.

Please send me a free copy of the "Handbook of V-Belt Drive Design."

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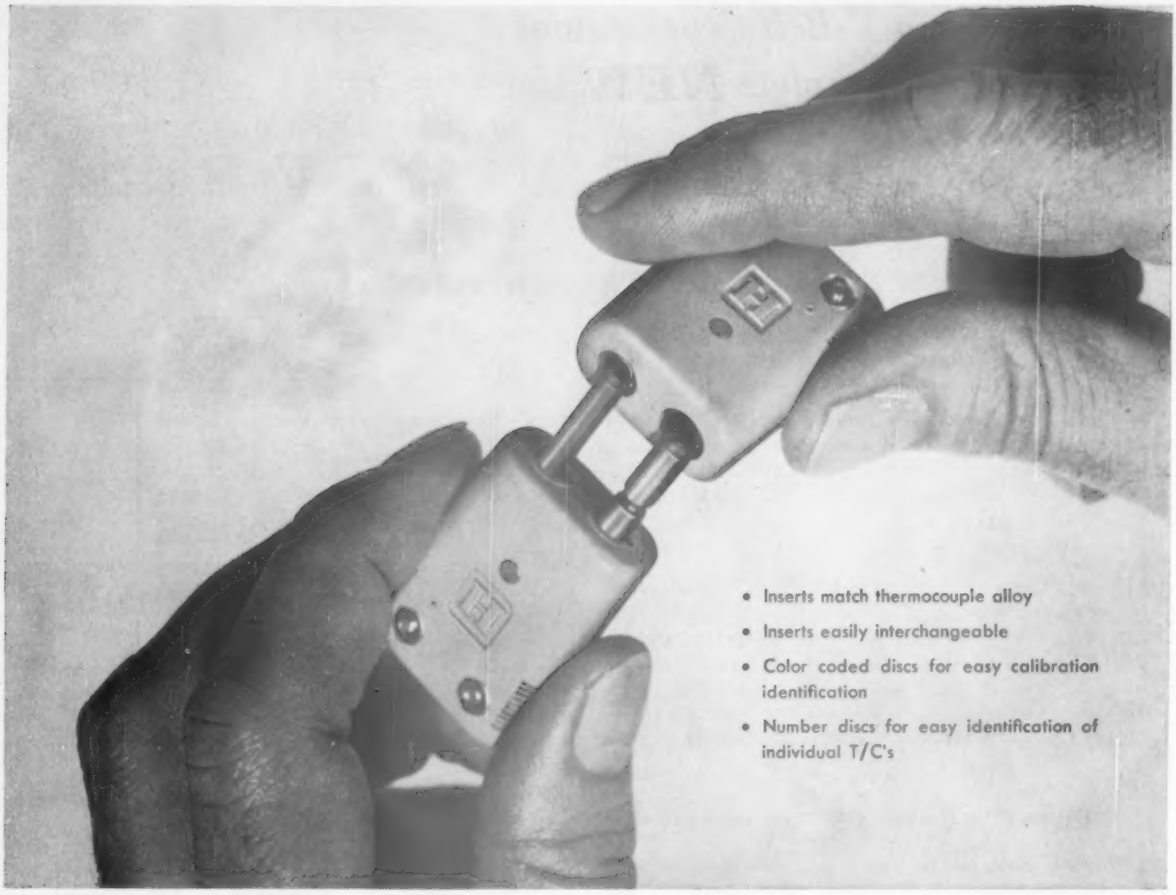
• Inserts match thermocouple alloy
• Inserts easily interchangeable
• Color coded discs for easy calibration identification
• Number discs for easy identification of individual T/C's

NEW *QuiK-Konnect** thermocouple components

For accurate, swift, and foolproof connection of thermocouples to extension wire

New *QuiK-Konnect* plug and jack bodies give fast, easy, and foolproof extension wire connections in plant, laboratory or test cell installations.

Inserts have different diameter positive and negative poles, for foolproof connection . . . are extremely easy to remove for field calibration change or replacement. Various tube adapters are available to protect small-diameter thermocouples, and cable clamps can be supplied to protect extension wires from fraying or tearing.

The *QuiK-Konnect* line, in addition to plugs and jacks, includes:

1. Single-jack panel that fits ¾-in. knockout.
2. 4-point jack panel that fits standard electrical outlet box.
3. Multiple jack strips.
4. Custom-built multiple jack panels.
5. *QuiK-Kords** for patch programming multiple jack panels.

You can get complete details from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, 21 Penn St., Fall River, Mass.

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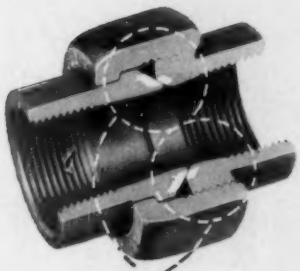
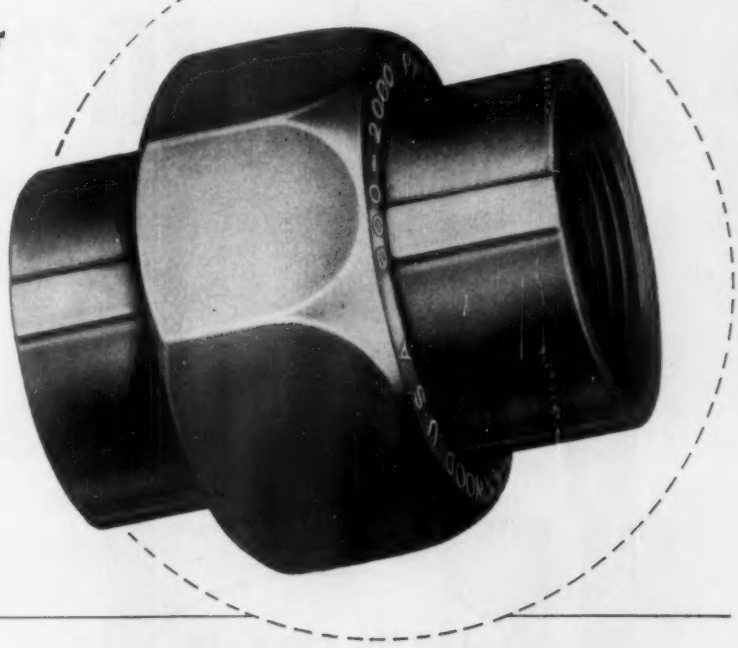
In Rockwood Unions . . .

the big hardness differential in seats



makes a big difference in the entire union



In Rockwood Union #603 both seats are made of corrosion-resistant AISI molychrome steel, forged in place and double-locked under 100,000-pound and 400,000-pound pressures.

The male seat is specially heat treated to make it 150 Brinell harder than the female seat.

No other union has this hardness differential, which eliminates galling in make-up and assures long, trouble-free service life.

There are other big differences in Rockwood Unions that mean greater safety and economy. For example:

- an exclusive cold forging process results in easily interchangeable parts, all with highest resistance to shock, jar, vibration, expansion and contraction.
- balanced design distributes built-in strength uniformly throughout each Union.
- "Rockwoodizing," a special coating process, protects threads and all other surfaces against corrosion.
- Color-coding of different type Rockwood Unions enables easy identification by warehousemen and pipe fitters.

Rockwood Unions are tested and listed by Underwriters' Laboratories, Inc., for use with flammable liquids and gases. Write for complete facts.

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A Division of The Gamewell Company
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Please send me prices and further information on Rockwood Unions.

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multi-purpose= maximum economy

Humble NEBULA EP-1 multi-use grease replaces several ordinary greases and gives you these economies:

- You buy one grease in quantity—save on quantity discounts;
- Your storage requirements are kept to a minimum;
- Your record keeping and inventory are simplified;
- You always have the *right* grease handy.

NEBULA EP-1 is top choice for the tough jobs because of its exceptional resistance to the effects of heat, water, oxidation and heavy loads. Order NEBULA EP-1 from your nearest Humble bulk plant in Texas, New Mexico and Arizona. Other areas contact Humble Oil & Refining Company, Houston, Texas.

NEBULA EP-1

is available in pails, drums and in handy cartridges.

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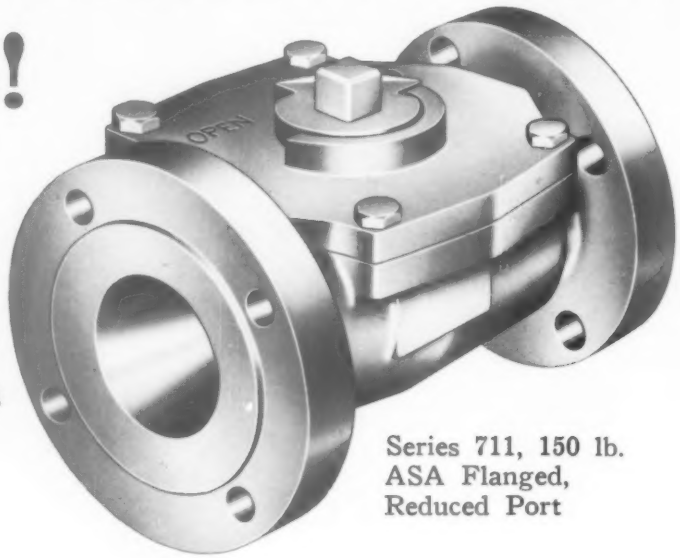
totally
new!

Only *FLO·BALL* valves are bearing-fixed for maintenance-free long life!

. . . with all the features you must have:

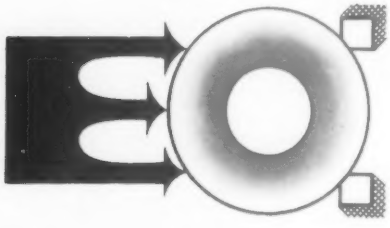
- **Top loading**
- **Replaceable seats**
- **One-piece ball and stem**
- **90° on-off**
- **Two-way flow**



Series 711, 150 lb.
ASA Flanged,
Reduced Port

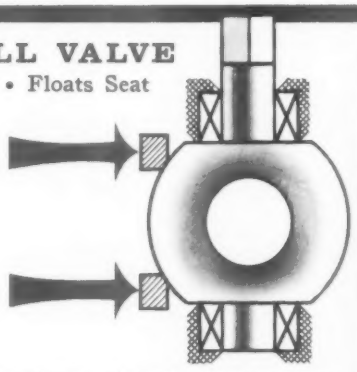
Now available . . . the result of years of intensive service in the missile-space industry . . . proven in thousands of adverse applications . . . now at mass produced prices . . . the most advanced line of ball valves ever manufactured . . . for you!

ORDINARY BALL VALVE
Floats Ball • Fixes Seat



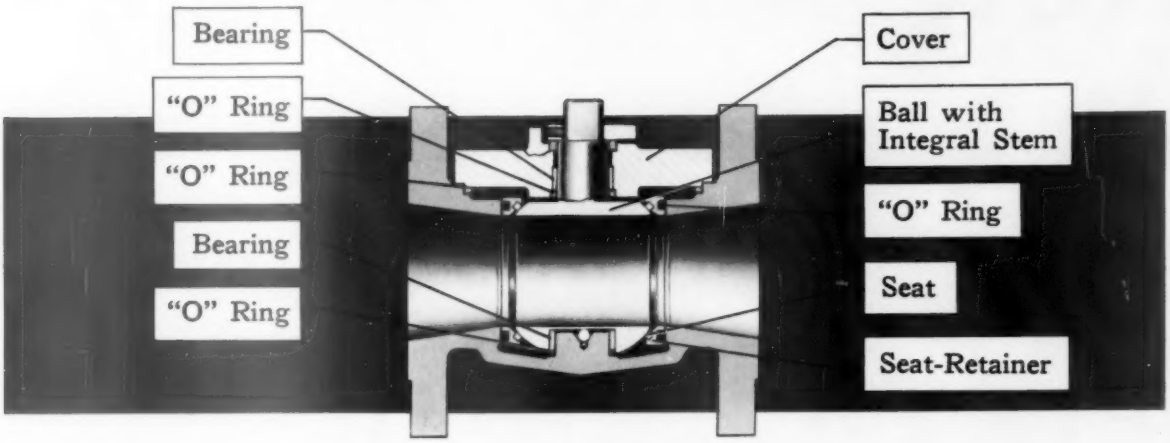
Floating ball puts excessive pressure load on fixed seats. Results in distortion and short life.

FLO • BALL VALVE
Fixes Ball • Floats Seat



FLO·BALL bearings absorb all pressure forces. Elimination of excessive seat loading insures long life.

The Series 711 ***FLO·BALL*** valves are available for off-the-shelf delivery. All are manufactured to standard ASA dimensions in semi-steel, carbon steel, 316 stainless steel, and aluminum (ASTM 356-T-6) for body and ball, Teflon for seats, and Buna "N" O-Ring seals. Other materials are also available. These valves operate at pressures to 300 psi, temperatures to 400° F.



The Hydromatics Series 711 FLO•BALL valve gives you the features you must have!

- Bearing-Fixed ball. Engineered to withstand shock and impact without distortion or backlash.
- Top loading. Valve can be disassembled and assembled without removing it from line. No special tools are required.
- Self adjusting, replaceable seats. Both balanced seats are self-aligning and self-adjusting for controlled seat loading and positive seal.
- No lubrication. Operates completely without lubrication.
- Zero leakage. At all operating pressures, including vacuum to 10^{-6} mm. of Hg.
- One-piece stem and ball. Simplified construction adds strength, precision and lower torque.
- Maximum flow efficiency. The open ***FLO·BALL*** valve provides an unrestricted, straight-thru fluid path.
- Lowest torque. Bearing-Fixed construction results in effortless, fast-action with low torque.
- Two-way flow. Exclusive ***FLO·BALL*** seat design principle insures perfect seal in both directions.

Hydromatics, Inc.

FLO· BALL

Mail this postage-free card today

Tear Along This Edge

Gentlemen:
Your Bearing Fixed Flo•Ball valves from ⅛" to 24" may help solve a problem relating to the control of:

☐ Corrosive Liquids ☐ Cryogenic Liquids ☐ Throttling Flow
☐ Vacuum ☐ High Pressure

My flow problem is_____

PLEASE: ☐ Have salesman call ☐ Send technical data

My name_____ Position_____
Company name_____
Address_____
City_____ State_____

Bearing-fixed

New Zero leakage

Maximum flow

Top loading New

No lubrication

One piece ball and stem New

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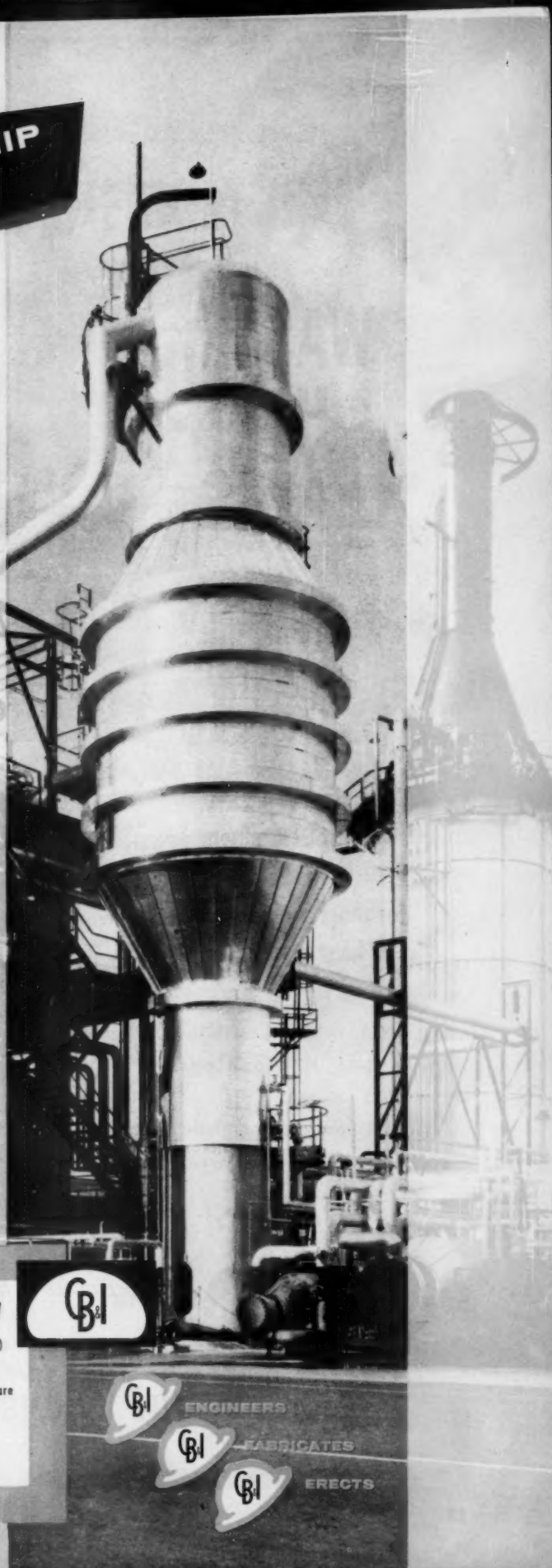
Special Vacuum Tower Fabricated and Erected by CB&I for El Paso Refinery

What is CB&I *Craftsmanship in Steel*? This unusual structure is a good example. It is engineering tempered with imagination. It is close attention to metallurgical control and structural detail. It is careful customizing of structure to process. Most important, it is *experienced coordination* through *all* phases of engineering, fabrication and erection.

These *coordinated services* are the reason why leading refiners rely again and again on CB&I for their critical tanks, towers and processing structures. For more information, write the nearest CB&I office, today. Ask for the brochure: *CB&I Craftsmanship in Steel.*

CB&I-built vacuum tower at El Paso refinery of Standard Oil of Texas. CB&I also built a reactor and regenerator, furnished through Fluor Corporation, Limited.



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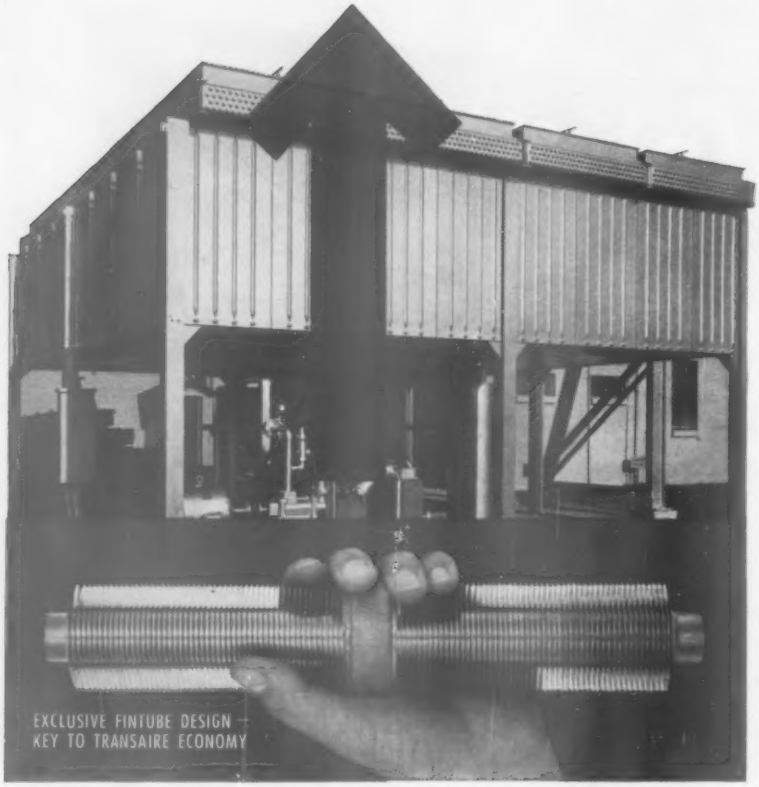
WASTE HEAT LEAVES

...AT LOW OPERATING COST



Transaire Air-Cooled Heat Exchangers use free air for most economical heat dissipation

When waste heat is to be dissipated, Transaire Air-Cooled Heat Exchangers do the job efficiently and economically. Simple in design, Transaire units are now being used in many varied processing operations. Even in areas where water is unlimited, the cost of providing cooling towers, pumps, water treating, etc., makes the use of Transaire exchangers attractive.

Transaire exchangers are mechanically and structurally designed to give low maintenance and operating cost for extended periods of operation. High heat transfer efficiency is obtained by use of the Aimco fintube, an exclusive Yuba design with tapered spiral fins mechanically bonded so that the entire base tube is covered and protected against galvanic action. Fins are usually aluminum, although other materials are available for special requirements. Base tubing can be provided in practically any material, size or gauge desired. Fin spacing and height can be varied.

Next time specify economical Transaire, or if your present units are structurally sound, investigate modernizing through replacement with the new high efficiency Aimco fintubing.

Yuba also manufactures a complete line of shell and tube heat exchangers, and will recommend either type, whichever is required or best suited for the job.

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specialists in heat transfer equipment

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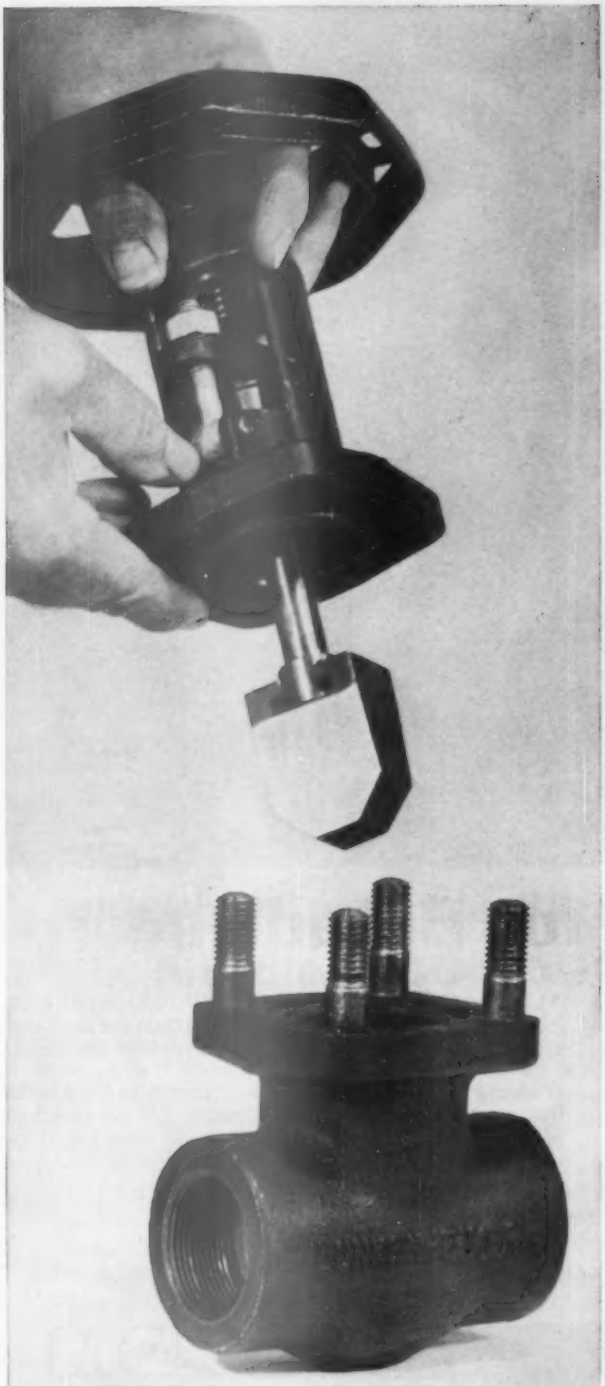

Fig. 8001 Screwed Ends. Sizes ½" to 2"
Fig. 8002 Socket Welding Ends

A New Lunkenheimer Valve

CHECK THE FEATURES OF THIS LUNKENHEIMER FORGED STEEL GATE VALVE

This new Lunkenheimer Forged Steel Gate Valve is already building a reputation for rugged service. Completely new in design, it's compactly built for fast installation in the most cramped quarters. Produced with famous Lunkenheimer materials and highly-skilled workmanship, it handles pressures of 800 lbs. at 850°F., and 2000 lbs. at 100°F. easily and safely. Discs are 13 Chrome Stainless Steel, heat treated completely through to 500 Brinell hardness to eliminate chipping or cracking. Rolled-in Seat Rings can't work loose. This newest addition to the world-famous Lunkenheimer line can help solve *your* valve maintenance problems. Call your Lunkenheimer Distributor, or write us for literature. The Lunkenheimer Company, Cincinnati 14, Ohio.

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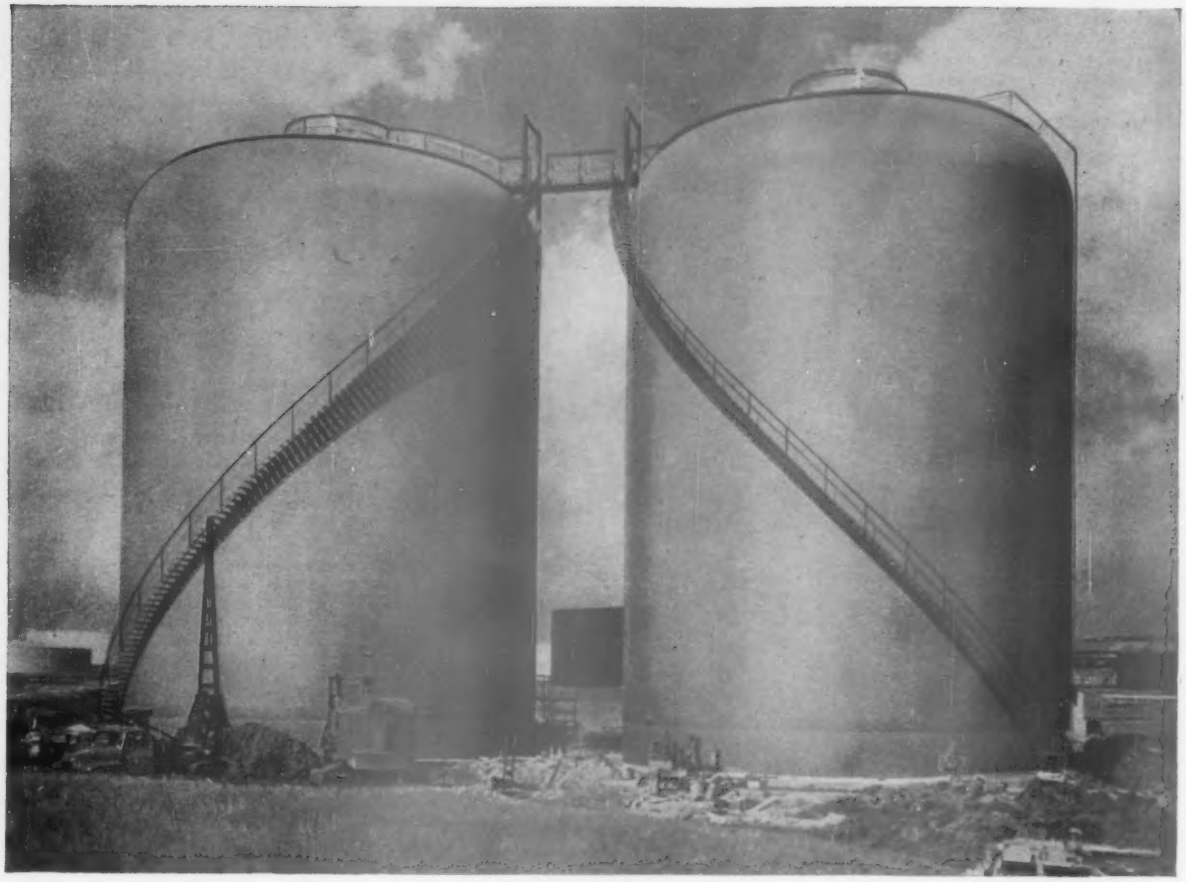
THE ONE *Great* NAME IN VALVES



Two Beauties for Butadiene

"Cool" is the word for these ellipsoids . . . they're built to store butadiene at just-above freezing temperatures, which in Texas means about 45° below ambient temperature. They're 60 feet in diameter and 62 feet high, with storage capacity of 40,000 barrels each.

Butadiene is a problem child when it comes to storage. Vessels must be cold-storage as well as safety-vaults. Operating in an ambient temperature of 80° F the butadiene liquid in these twin ellipsoids had to be refrigerated to 35°F at 10 psig so that it could be kept "indefinitely."

At higher temperatures butadiene will deteriorate. Four inches of glass fiber insulation help maintain the low storage temperature to guarantee the quality of the butadiene.

It takes a heap of know-how and experience to build tanks that meet such stringent requirements. We are proud to have been given the opportunity to build these two ellipsoids for Hess Terminal at Galena Park, Texas.

For any type of process vessel made of metal plate, consult the Pittsburgh-Des Moines Steel Company.

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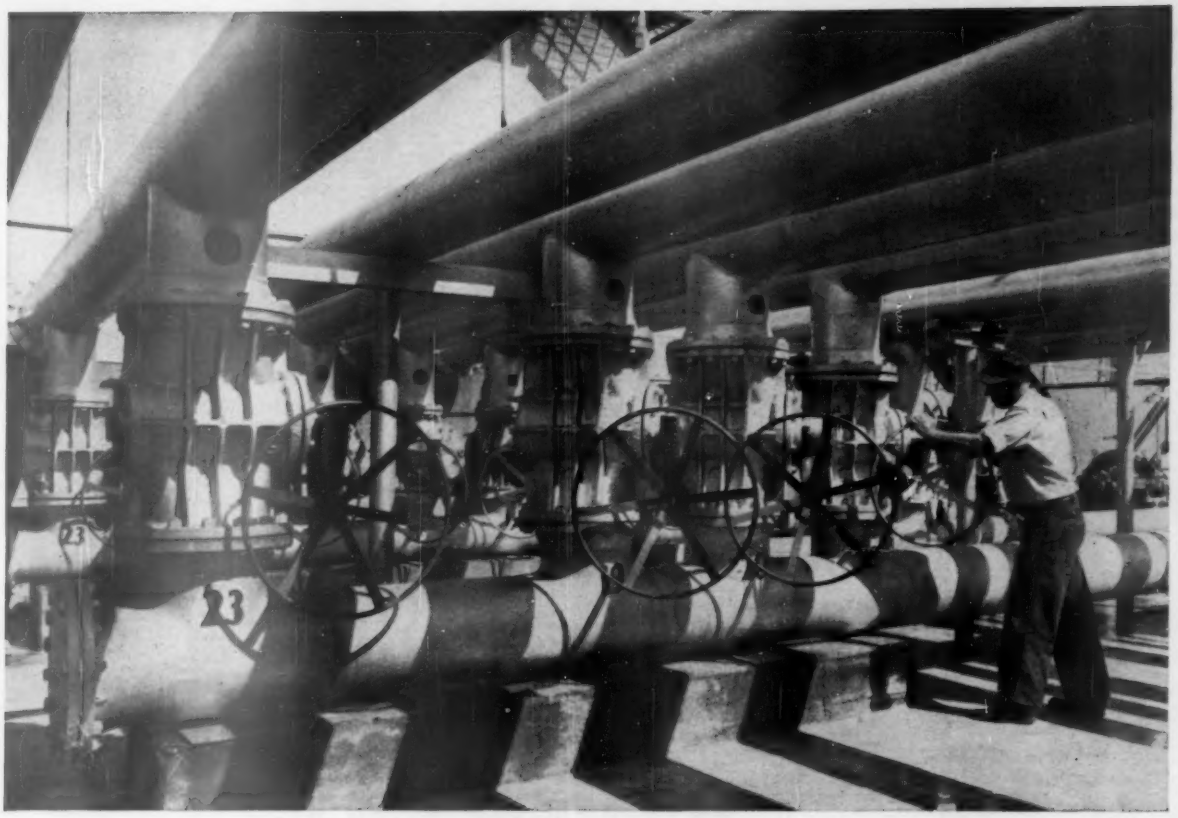
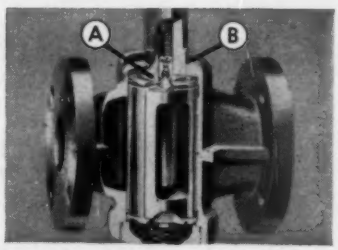


When it comes to quick, efficient control of petroleum products . . .

these Homestead® Lubricated Plug Valves handle 2,000,000 barrels a month!

At the West Coast marine terminal shown above, the tremendous flow of gasolines and oils from storage and tankers demands smooth, positive operation at all times. For this reason, 33 Homestead Lubricated Plug Valves in sizes from 8" to 16" were specified for this installation.

Today more and more oil companies specify Homestead Valves for their dependable, maintenance-free performance and built-in engineering advances. For example, *100% pipe area* reduces ship loading and unloading time. *Pressurized chemical seal* and closely fitted plug and body assure positive shut-off, no mixing of different fluids. *Controlled lubrication* provides full coverage of sealing surfaces without contamination of line fluids. *Quick operation* . . . Homestead Valves are fully opened or closed in a quarter turn of the plug.



Cross-section of Homestead Lubricated Plug Valve. Triple head seal (A) prevents leakage. Tell-tale lubricant ring at (B) signals full system, prevents waste of lubricant and contamination of line fluids.

For complete details and valve recommendations for *your* application, mail coupon below.

Homestead Valve Manufacturing Co.
P.O. Box 406, Coraopolis, Pa.

Gentlemen:
Please send reference books on Homestead Lubricated Plug Valves and their uses.

Name.....Title.....

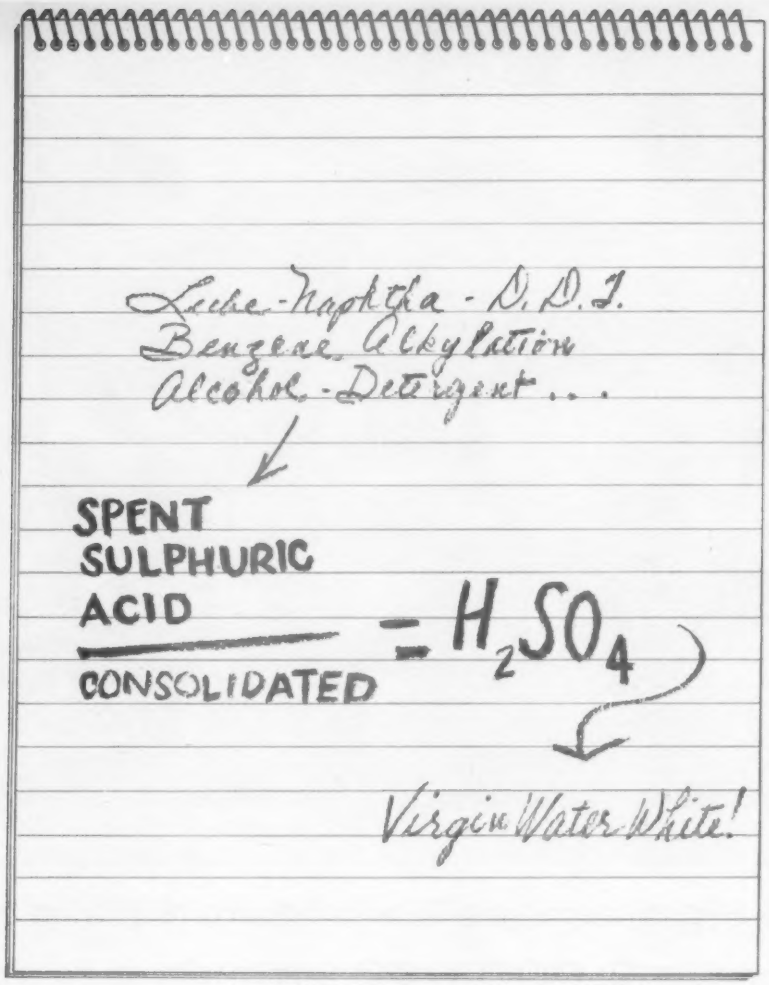
Company.....

Address.....

City.....Zone.....State.....

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
Coraopolis, Pennsylvania



Send your spent sulphuric acid through Consolidated and get it back as water-white H_2SO_4. Normally we deliver 99% but you can have it to a fraction of a percent . . . tailor-made for your plant process as delivered.

Spent acid shipments and acid deliveries by truck, tank car or barge—yours or ours—to or from our regeneration plants at Houston and Baytown, Texas, Baton Rouge, La., Hammond, Ind., and Dominguez, Cal.

Consolidated transportation facilities are an advantage, too. We have a large fleet of barges and tank cars and an exceptionally fine traffic department. Movements are traced day by day . . . deliveries are prompt and reliable.

Sulphuric acid is also shipped from other plants at Fort Worth and Corpus Christi, Tex., LeMoyne, Ala., Vernon and Richmond, Cal., and Tacoma, Wash.

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Series 701 Screw End Check Valve Illustrated
Series SW701 Socket Weld End Valve also available

FORGED STEEL BOLTED BONNET

CHECK VALVES

150-800 POUNDS @ 850°F
2000 POUNDS COLD WORKING PRESSURE W.O.G.

1. These valves have Stellite* hard faced integral seats
2. 13% Chrome stainless piston checks
3. Stainless steel asbestos spiral wound body-bonnet gaskets
4. Forged steel bodies designed for light weight with maximum strength
5. Available in ¼" thru 2" sizes in both screw and socket weld ends

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*Product of Union Carbide Corp.

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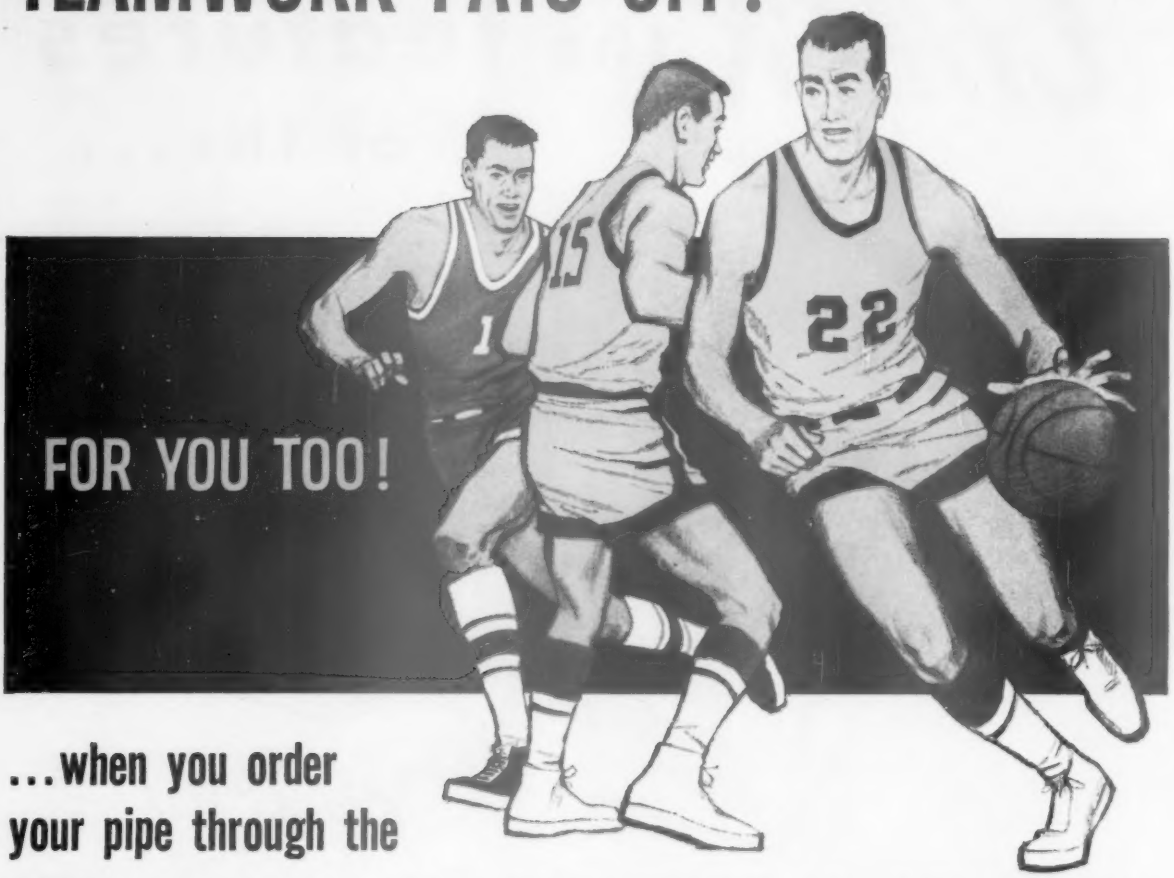
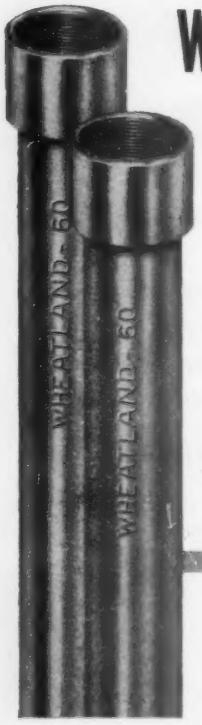


...when you order your pipe through the

WHEATLAND PRODUCER-JOBBER TEAM



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See your Wheatland Pipe Distributor for black or galvanized Wheatland Steel Pipe.

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API LINE PIPE IN ACCORDANCE WITH AMERICAN PETROLEUM INSTITUTE SPECIFICATIONS

It's a fast ...Rigging Job with NORTHWEST TRUCK CRANES!

The Two Northwests set the drawworks.

Pictures and Data courtesy of the Drill Bit Magazine.

TC-35-22-LC

TWO NORTHWEST TRUCK CRANES gave a snappy demonstration of how rubber-tired equipment can speed up a rigging job. The drilling was being done by the Llano Drilling Company on a Texas Company lease. Two contractors, the J. H. Marks Trucking Company and Clyde Yarbrough, Inc., both of Odessa, Texas using Northwest 35-ton Truck Cranes combined for a fast finish on the rig.

The first crane, that of J. H. Marks, arrived on the job at 8:30 A. M. and put the engine structure together.

The derrick was released by the riggers at 10:30 A. M. and the Yarbrough Crane arrived at 10:15 A. M. The two cranes tied into the drawworks at 10:30 A. M. The drawworks weighed 78,000 lbs. The engine structure was 6 ft. and the derrick floor 10 ft. high. The two cranes set the drawworks on the engine structure and one crane moved to the opposite side of the rig.

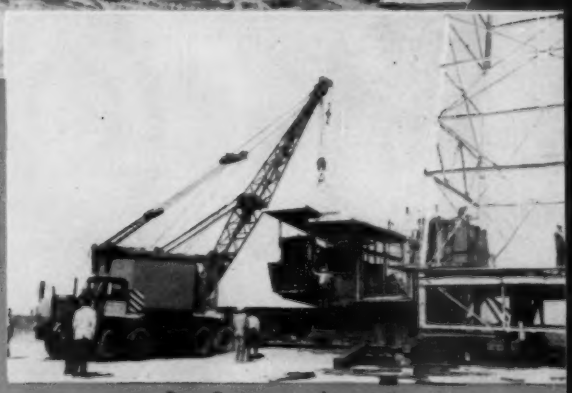
The two cranes again lifted the drawworks and swung it into position and set it over the bolt holes where the crew immediately bolted it down. It was only 25 minutes from the time the cranes picked up the drawworks until it was tied down.

One crane was then released to load the derrick floor. The other crane set the engines. The engines with the compound weighed 32,000 lbs.

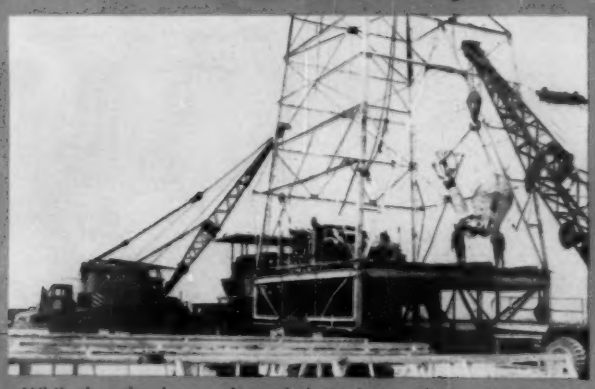
The second crane then boomed through the V-door and set the rotary table, traveling block and crown where the crew wanted them. One crane left at 12:30 and the other finished and left at 3 P. M.—a total of 6½ working hours.

Your Northwests are always ready to go. We hear it everywhere and operators and owners will tell you so. If you are figuring on crane equipment, find out about the many advantages Northwest brings you.

NORTHWEST ENGINEERING COMPANY
1513 Field Building, 135 South LaSalle Street, Chicago 3, Illinois



One Crane sets the engines.

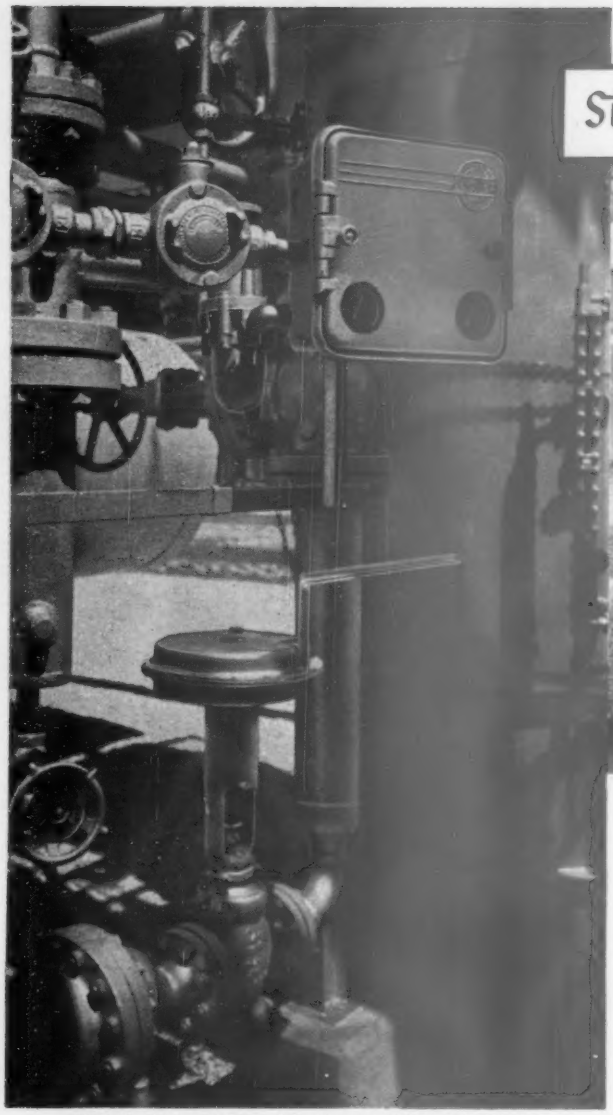


While the other booms through the V-door with traveling block.

CRANES
SHOVELS
DRAGLINES
PULLSHOVELS
TRUCK CRANES

3/4 to 3 Cu. Yd. Capacity

NORTHWEST



BS&B Liquid Level Control for Propane Refrigeration System

Super 70's "On Stream"

Super 70 Diaphragm Control Valve
as Debutanizer Reflux Flow Controller

BS&B

ELECTRO-PNEUMATIC CONTROLS SERVING WARREN'S MONT BELVIEU PLANT

In their Mont Belvieu Fractionation Plant, Warren Petroleum Corporation separates propane, isobutane, normal butane and natural gasoline. Efficient day in, day out operation of this large plant is assisted by BS&B Super 70 Control Valves, Liquid Level Controls and Regulators.

A complete modern electronic control system was designed and installed in Mt. Belvieu for the control of precise product purity. BS&B's level controls and control valves were selected as primary and final control elements, due to their superior performance characteristics and rugged dependability.

BS&B Controls are proving their superiority in service the world over. Specify them on your next job.

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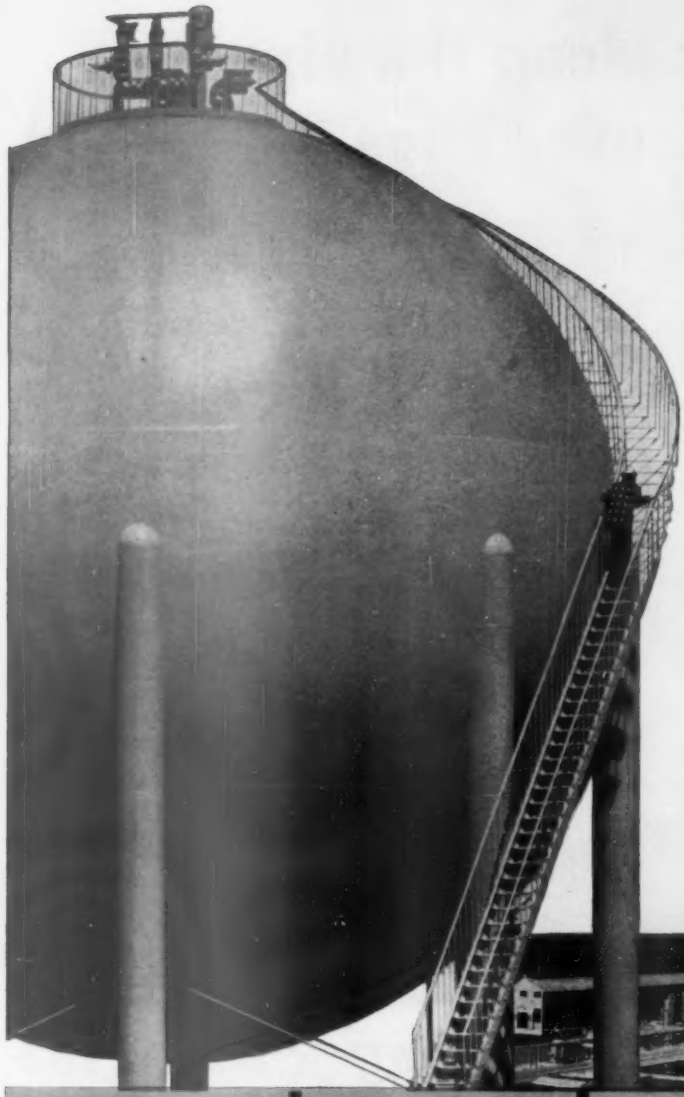
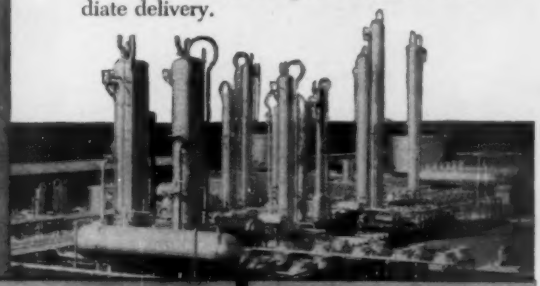


Tough, colorful, lasting beauty!

Take those pumps and rigs in the oil fields—or those tanks and pipelines in the refineries! Each needs the tough, colorful, lasting beauty that Rust-Oleum provides. If the surface is rusty, Rust-Oleum 769 Damp-Proof Red Primer can be applied *right over the sound rusted surface* after removing rust scale and loose rust. Special Rust-Oleum Oil Field Finishes match the original equipment colors on pumps and rigs—while other long-lasting Rust-Oleum coatings protect costly tanks and pipe lines.

They're specially made for oil field use—tough, flexible, easy-to-use on the spot by brush or spray! They dry to firm, glossy finishes that resist sun, fumes, heat, moisture, weathering, and blowing dust and sand.

Try Rust-Oleum . . . your Rust-Oleum Distributor maintains complete stocks for immediate delivery.



Apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound rusted surfaces.

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When rock looms along the pipeline ...Gardner-Denver joins the spread

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"Twindril"®

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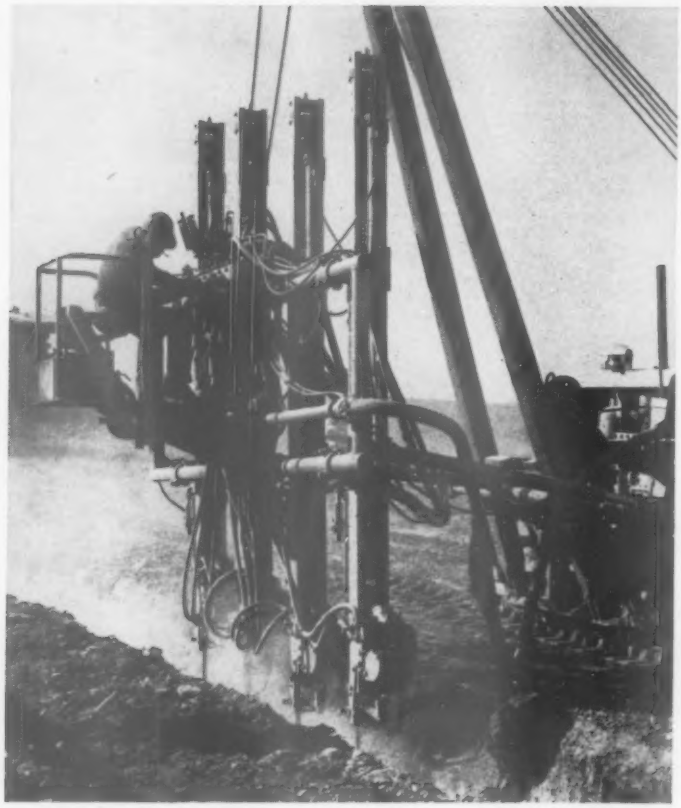
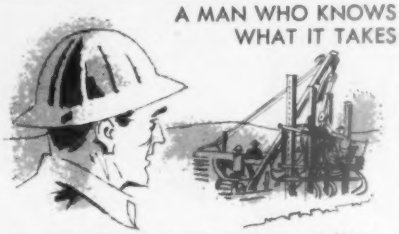
Hand-held rock drills

Pipeline testing air compressors





Gardner-Denver equipment specialists know their field from firsthand experience . . . back up every product with service beyond the call of duty. At Gardner-Denver there's no substitute for men—our 100-year philosophy of growth.

Gardner-Denver equipment is designed for the rugged overland pace of pipeline construction. It is engineered to provide maximum service with a minimum of maintenance. For example, Gardner-Denver rotary portable compressors are built to withstand operation in all climates, weather and altitudes . . . parts are easy to inspect and maintain in the field.

At the other end of the pipeline Gardner-Denver pipeline testing air compressors pressure-test pipe to make sure it's ready for service.

Consult with confidence. Consult your Gardner-Denver equipment specialist or write for information.

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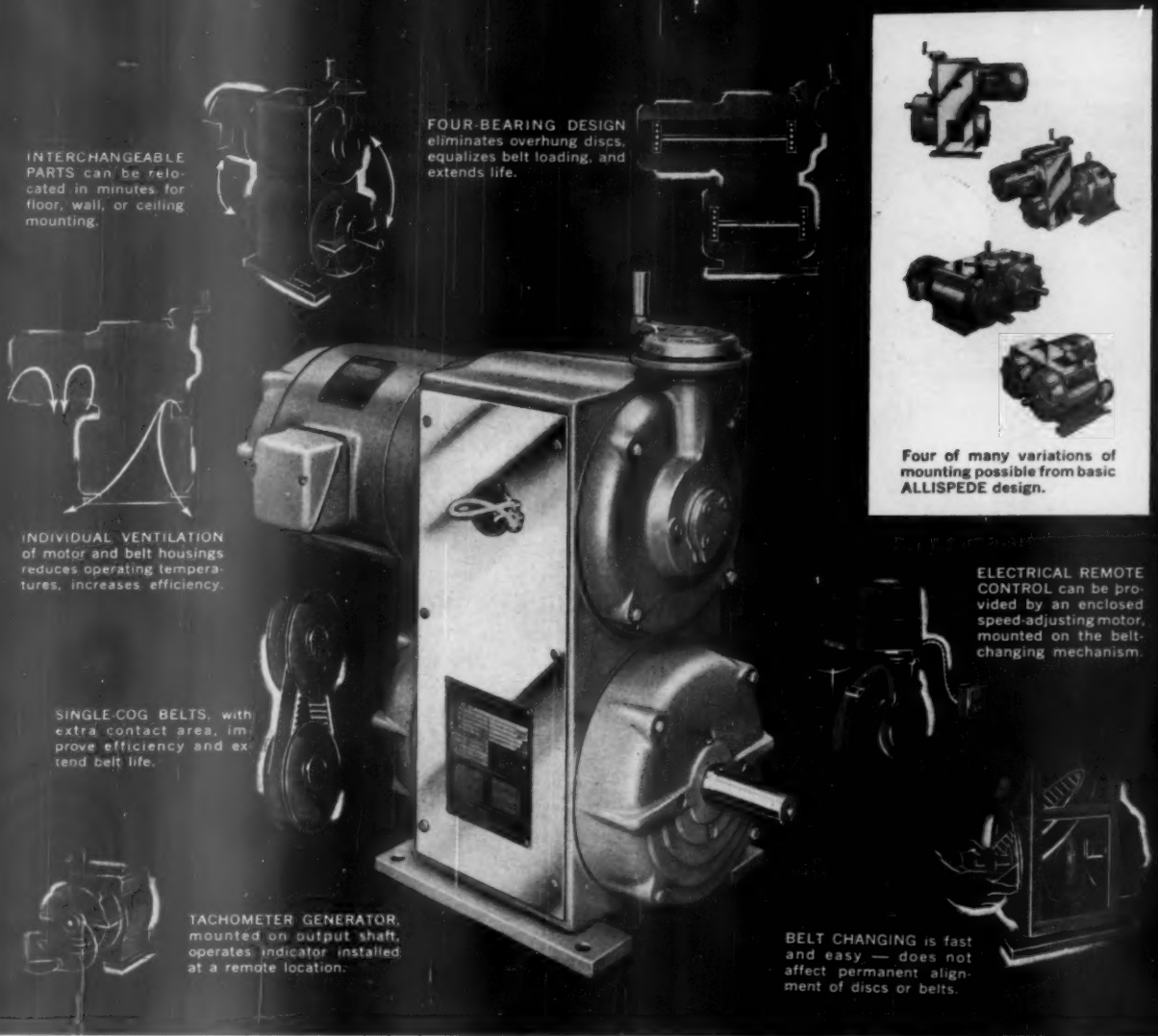
INTERCHANGEABLE PARTS can be relocated in minutes for floor, wall, or ceiling mounting.
FOUR-BEARING DESIGN eliminates overhung discs, equalizes belt loading, and extends life.
Four of many variations of mounting possible from basic ALLISPEDE design.
INDIVIDUAL VENTILATION of motor and belt housings reduces operating temperatures, increases efficiency.
ELECTRICAL REMOTE CONTROL can be provided by an enclosed speed-adjusting motor, mounted on the belt-changing mechanism.
SINGLE-COG BELTS, with extra contact area, improve efficiency and extend belt life.
TACHOMETER GENERATOR, mounted on output shaft, operates indicator installed at a remote location.
BELT CHANGING is fast and easy — does not affect permanent alignment of discs or belts.

Let's look at the features of the ALLISPEDE* Drive

New Louis Allis drive offers accurate control—maximum belt life—long-run economy—low-cost versatility—ease of installation

Here's a drive so easily adaptable to changing physical and operating needs that it obsoletes obsolescence. You can relocate components — add or remove attachments and controls — in the field, in minutes.

Its *all-new* design improves performance and efficiency. Inspection, servicing, and belt-changing are a snap. Furthermore, maintenance is almost nil.

As for versatility — there's an Allispede to meet whatever mechanical drive requirement you have. Sizes up to 30 hp, output speeds from 1 to 10,000 rpm, and speed ranges up to 8:1. Motors can be open, drip-proof, enclosed, or explosion-proof—with ventilated or enclosed belt housings — for foot, P-base, C- or D-flange mounting on your machine.

Allispede is available with parallel shaft, or right-angle, integral speed reducers; special shaft extensions; integral magnetic brakes; electrical or mechanical remote control, and other modifications.

Interested? Contact your nearby Louis Allis District Office or write to The Louis Allis Co., 449 East Stewart Street, Milwaukee 1, Wisconsin, for a copy of Bulletin 3600.

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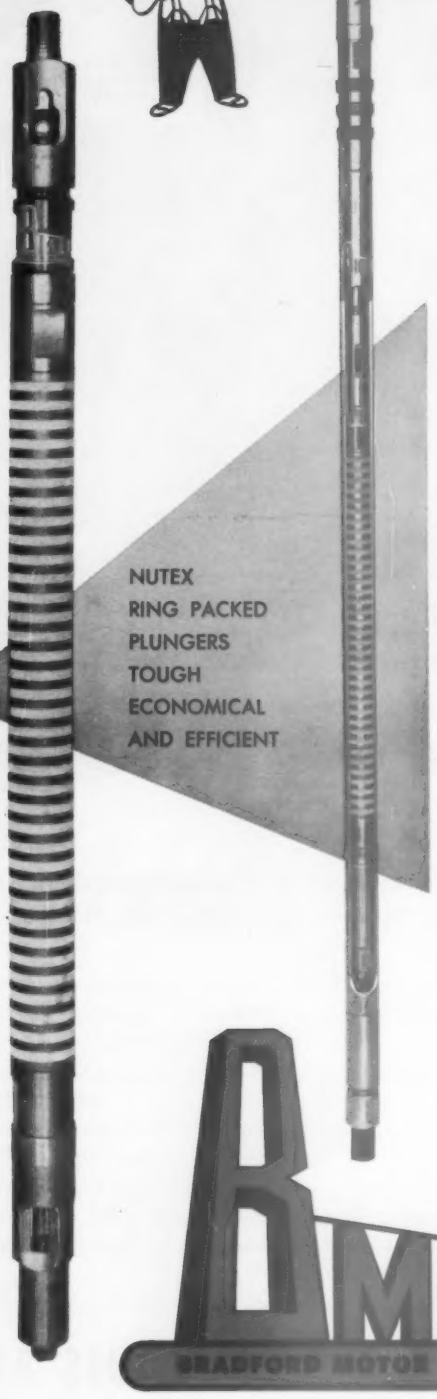
LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

ASD-133

Plain Talk!



A TRUE STORY . . . . .

with a MONEY-MAKING MORAL

Recently the District Superintendent for a major oil company in the Gulf Coast of Texas quite frankly stated that he was not "sold" on composition ring pumps below 4,000 feet. However, he was broad-minded enough to test a composition ring pump in a well considerable deeper.

He has now converted completely to composition ring pumps.

LET'S LAY THE CARDS ON THE TABLE!

A composition ring pump won't work in every well . . . and neither will any metal to metal pump. It's a fact that if the composition ring pump will work, it will save a lot of money and it's also a fact that it won't cost but little to try a NUTEX. If it works . . . and the chances are good that it will . . . the savings on a lease basis will be very profitable.

With short ring plungers, depth capacity was limited. Some people still think of soft packed pumps as shallow pumpers — to approximately 4,000 feet. Today 120 ring and 160 ring NUTEX plungers are pumping successfully and regularly from 7900 to 8400 feet!

When the composition ring plunger is made the length of the metal plunger, the results are "PLAIN TALK" about *true* economy in pumping.

Investigate today! WHY NOT???

Available Thru All Supply Stores

OIL WELL PUMPING EQUIPMENT SINCE 1911
SUBSURFACE SPECIALISTS

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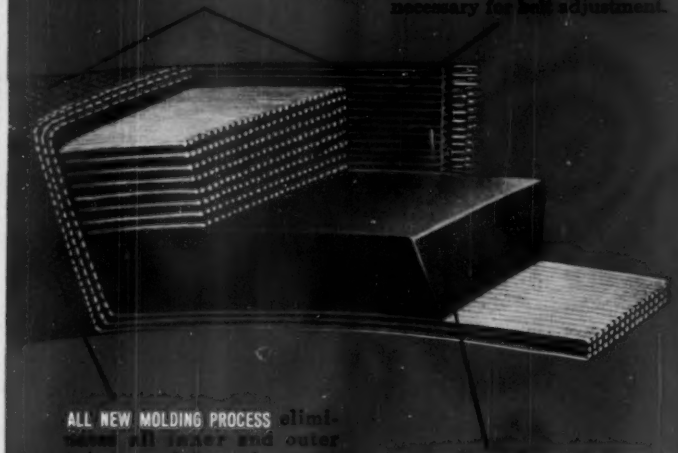
NEW C-E GREEN TRIANGLE SUPER V-BELTS

40% MORE CAPACITY

..NO PRICE INCREASE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ALL NEW CORDS Each fiber of the cord is impregnated with latex, not merely surface coated. Cords are built into the belt under tension with errorproof electronic precision, so each cord pulls its full share of the load uniformly with maximum shock resistance. Uniform tension on cords prevents belt turning over in grooves and reduces stretch, so less downtime is necessary for belt adjustment.
ALL NEW MOLDING PROCESS eliminates all inner and outer joints and laps for even longer belt life.
ALL NEW BOTTOM RUBBER COMPOUND has less heat build-up for longer life.

New materials . . new techniques . . the use of modern electronic equipment . . all combine to make possible the 40% more capacity in C-E Green Triangle Super V-Belts with *no price increase.* This means real economy! Fewer belts are needed to transmit the same horsepower on both new and existing drives. Belts are packaged in MATCHED SETS for uniform high quality, grade, size, diameter, strength and freshness . . sold exclusively through Continental-Emsco stores and representatives, worldwide.

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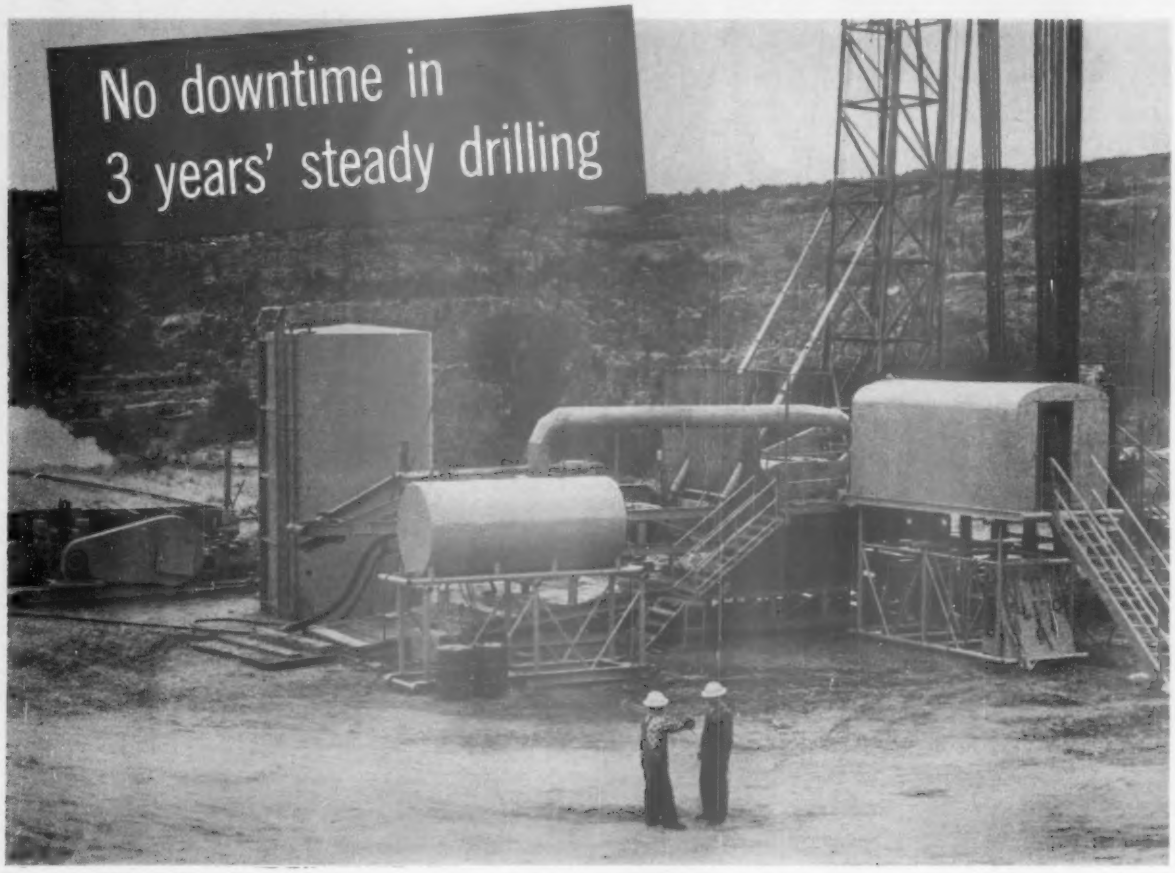


ELIMINATE downtime on your drilling rig for 3 years and productivity's bound to go up. It certainly has for Evitt Drilling Company of Casper, Wyoming.

Their GM Diesel-powered trailer-mounted rig made hole for three solid years without a second's downtime—never stopped drilling (except for moves) in all that time.

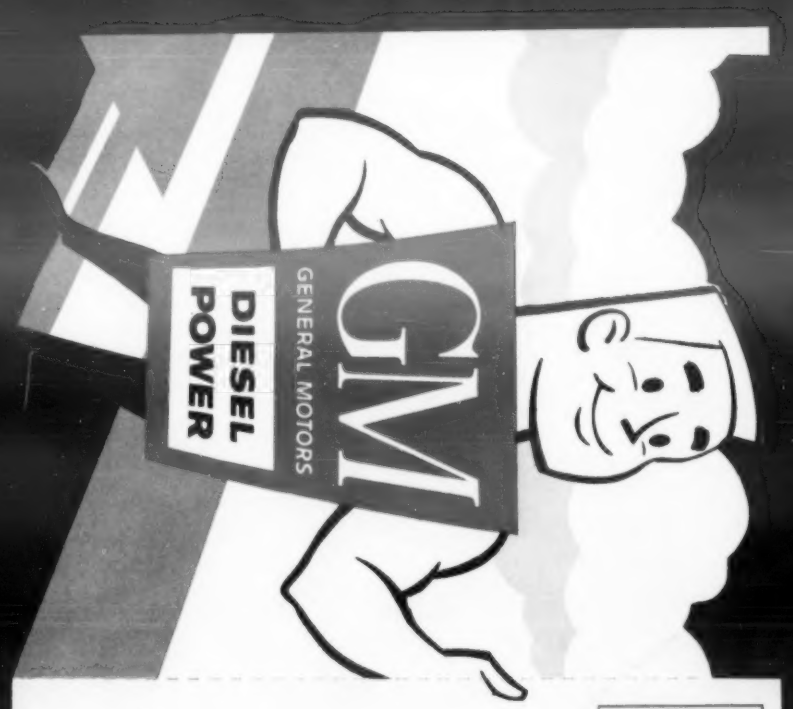
And, according to Tool Pusher L. J. Frerking, GM Diesel's uninterrupted service is just one reason why his rig's productivity is up. Some others? Fast acceleration under full load—lower operating, parts and overhaul costs—safety over butane in fields where gas is present.

What's more, he'll tell you the compact size and light weight of the GM Diesels give him faster, cheaper moves.

Evitt's rig has Twin "6-71" GM Diesels running an Oilwell $7\frac{1}{4}$ x 12 mud pump and TR 77 Cardwell Drawworks. The "Jimmys" have just been overhauled for the first time in 3 years—are ready for more years of downtime-free drilling.

Your productivity—and profits—will go up, too, with GM Diesels in your rigs. Mail the postcard today for full details, or see your GM Diesel distributor for the whole story.

GM DIESEL ALL-PURPOSE



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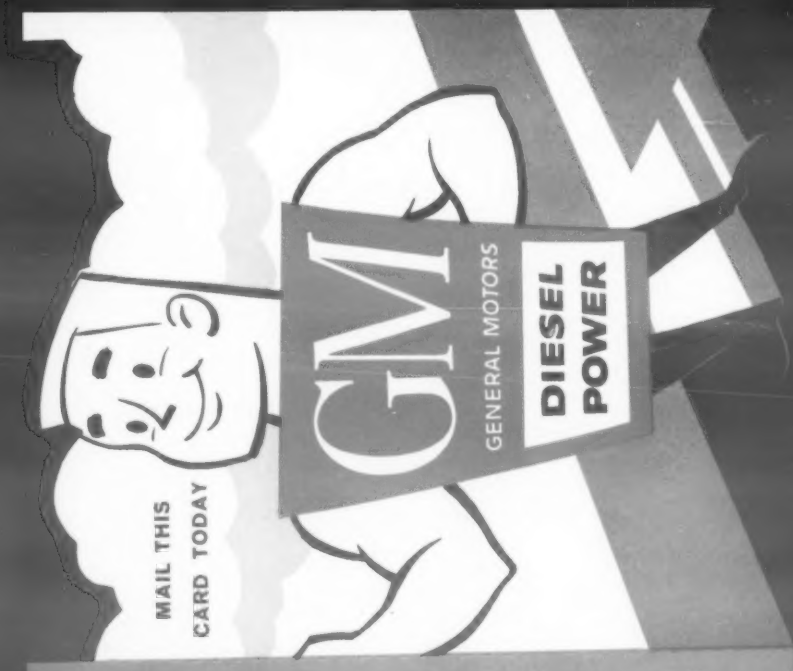

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(type of equipment)

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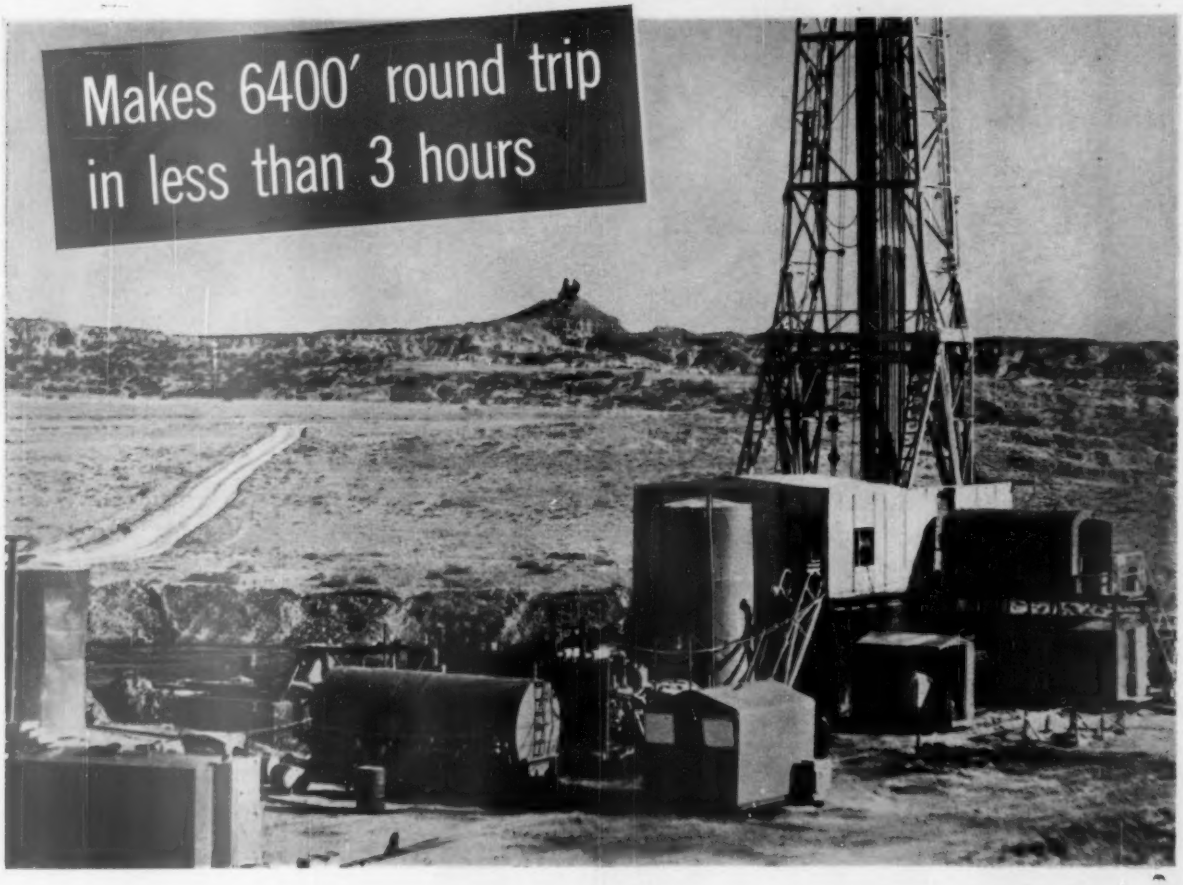
GET A GM DIESEL ENGINE



CAN your rig make a 6,400-foot round trip with 4" pipe and twenty-two 6¼" drill collars in less than three hours?

Brinkerhoff Drilling Company's GM Diesel-powered rig can—and that's just one reason why this rig's productivity is hitting new highs according to Tool Pusher Charles Lockhart.

Talk to Lockhart and he'll tell you, "Those GM Diesels help us make faster trips, drill faster, give us far less time-wasting downtime—in other words, more hole per day at lower cost."

A pair of 6-110 "Jimmy" Diesels drive the Emsco D-300 mud pump and 350 drawworks on this rig. Driving through a torque converter, the engines easily started their 150,000-lb. string off bottom—made the round trip without shocks, strains or jolts.

Put a "Jimmy" Diesel in your rig and you'll get the kind of money-making productivity Brinkerhoff is getting. Details? See your GM Diesel distributor or send the postcard today.

GM DIESEL

DETROIT DIESEL ENGINE DIVISION, GENERAL MOTORS, DETROIT 28, MICH.

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They Say—

We exaggerated!

Dear Sir:

In your November 16, 1959, issue (p. 136) you kindly give an abstract of my talk at the conference sponsored by Columbia University and the American Petroleum Institute in New York. Unfortunately, a most serious misunderstanding has occurred.

You quote me as saying that the percentage of carbon dioxide in the atmosphere could reach 16% by the end of this century. What I have actually said was that the carbon dioxide content could increase by 10% of its present value.

Since at present the carbon dioxide amounts to 0.03% of the atmosphere, my statement actually means that by the end of the century this amount would have increased by 10% to approximately 0.033%. Thus the added amount of carbon dioxide will be only about 0.003% or 30 parts in a million of the atmosphere.

Even this very small increase might, however, give rise to the serious consequences which you correctly quote in your abstract.

Edward Teller
University of California

Square item, hip reader

The Editor
The Oil and Gas Journal,
Gas Journal

Gentleman, man!

January 18, 1960—vol. 58, no. 3, page 127, man. What is the, this man, yeh.

A Reader, man
Houston

Dear Reader, Man:

We like, uh, goofed. The, this is what is like dropping the spacer between two columns of type, making readers' eyeballs jump the gap and go into, yeh, orbit. It shouldn't happen to Rover, dog—much less to a reader, man. And thanks, and sorry. You are like, out there.

Editor, man.

"Turnkey" defined

Dear Sir:

Would you be so kind as to give me a definition of the term "turnkey" as it might be used in a drilling con-

Superior engines power the pumps for world's largest waterflood!

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tract? What does it involve; is it understood in all oil districts?

L. M. Armstrong
Houston

(Editor's note: A turnkey drilling contract calls for a "package" job. Usually the contractor is to drill and complete the well, but, of course, there are many variations. The operator pays the contractor only a certain sum of money, regardless of any drilling troubles encountered. For more information see "Turnkey Drilling Contracts," OGJ, Oct. 12, 1959, p. 124.)

Orchids from independent

Dear Sir:

I would like to comment on the tremendous value that The Oil and Gas Journal offers a small independent producer.

Thank you for making such a valuable publication available.

George M. Gernhardt
Independent Operator
Mansfield, Ohio

Coal people mean business

"There are a number of movements afoot in Washington which give every evidence of having real steam behind them.

"One of the most important and pressing is the determined drive by the coal industry to gain competitive advantages by getting Congress to regulate oil and gas out of markets it has won from coal.

"The coal industry arguments sound quite plausible to someone who doesn't know the facts.

"It's our job to spread those facts before the public—including that key segment of the public which makes up the industry's own personnel.

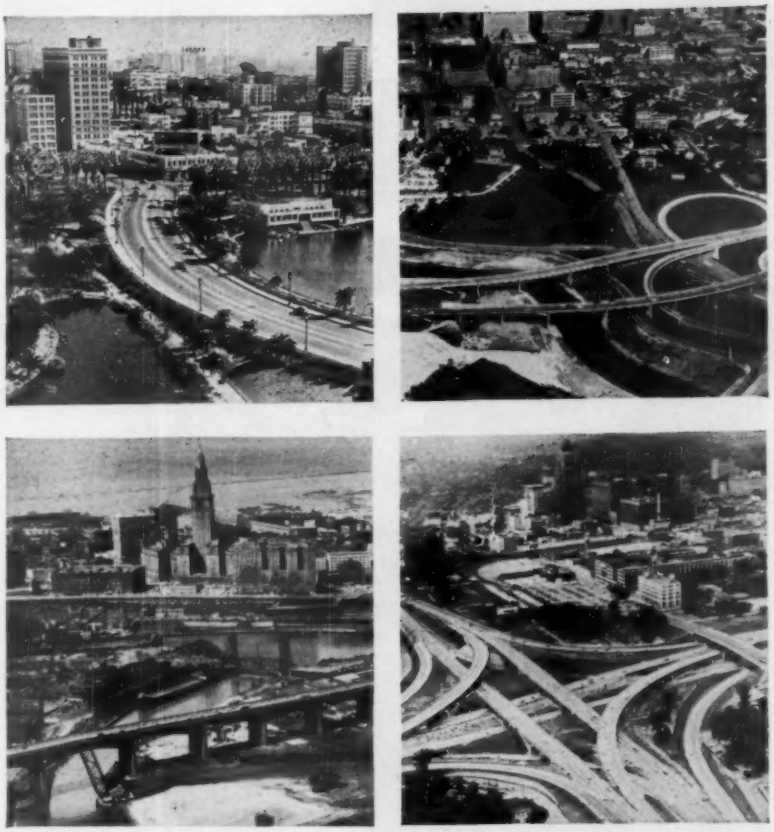
"The coal people have made their plans with care. They will not be blocked by any half-hearted effort from the oil industry. What they claim, in essence, is that we're in danger of running out of oil and gas. I hardly need say that this . . . cannot stand the heat of factual information.

"First, oil and gas reserves are at their highest point in history and there's no threat at all of future supplies being scarce.

"The U. S. Geological Survey estimates that ultimate petroleum resources still left to be discovered and developed in this country amount to some 240 billion barrels. By way of comparison, 60 billion barrels have been produced since Uncle Billy Smith drew the first scoopful from Drake's Titusville 'folly.'

"On the other side of the coin, estimates of coal reserves have been dropping for 40 years. And although

Which city is Los Angeles?



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ANSWER: The City of the Angels is shown at the upper left. The others are Houston (upper right), Cleveland (lower left), and Detroit (lower right).

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there's plenty of coal left in the ground, as the coal industry claims, most of it is of little use because it can't be produced at competitive prices."

Kerryn King, vice president, Texaco Inc., in a speech to the New York regional conference on employe communications.

Squeezed into economizing

"The Government is spreading total imports by granting quotas to refiners in almost inverse ratio to refinery runs—somewhat upon the 'small-business' principle.

"In turn, the inland refiners, unable to receive shipments of the foreign crude oil into their plants, have, by trading, received bonuses or premiums up to $1.10 per daily barrel of quota.

"They have kept up or increased refinery runs and used these bonuses to underwrite the disposition of the resulting products at cut prices.

"I believe this factor has contributed as much or more to the weakened prices than the more usual form of oversupply without subsidy. I fear this feature of the import plan may have resulted from a misunderstanding that confused trading crudes with the trading of refinery capacity to supply normal markets.

"As well as suffering from uneconomic prices for its products, the oil industry has seen its profits squeezed by increased labor and materials costs and by the increased difficulty and higher costs of finding oil in the United States.

"The recent lean period has brought forcefully home to all oil companies the necessity for maximum efficiency in every phase of their operations. Our company, for example, has 2,500 fewer employes (or 19%) than it had 4 years ago, yet is doing a larger volume of business."

Robert L. Milligan, president, Pure Oil Co., in a speech to the National Industrial Conference Board.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

FEBRUARY

14-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Statler-Hilton and McAlpin hotels, New York.

18 Chemical Institute of Canada, protective coatings division conference, Toronto.

19 Chemical Institute of Canada, protective coatings division conference, Montreal.

21-24 American Institute of Chemical Engineers, meeting, Biltmore Hotel, Atlanta.

24-25 Wisconsin Petroleum Association, annual convention and exhibit, Schroeder Hotel, Milwaukee.

24-25 Oklahoma State University, technical conference on natural gas engineering, Stillwater, Okla.

25 American Chemical Society, Delaware Valley region petroleum symposium, Philadelphia.

24-26 National Association of Corrosion Engineers, Tulsa section, eleventh annual corrosion short course, Mayo Hotel, Tulsa.

26 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

26 Ohio Oil and Gas Association, winter meeting, Deshler-Hilton Hotel, Columbus, Ohio.

MARCH

2-4 American Petroleum Institute, Division of Production, southwestern district meeting, Statler-Hilton Hotel, Dallas.

3-4 American Gas Association, Pacific Coast Gas Association, joint public relations conference, Biltmore Hotel, Santa Barbara, Calif.

4 Southern Gas Association, transmission management conference, Jung Hotel, New Orleans.

6-9 American Society of Mechanical Engineers, gas turbine power and hydraulic conference, Rice Hotel, Houston.

7 Canadian Petroleum Association, annual general meeting, Hotel Palliser, Calgary.

7-8 University of Florida, annual heat

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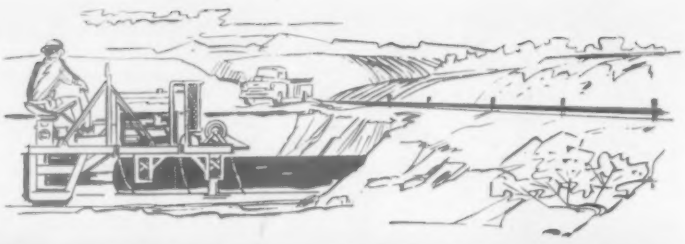

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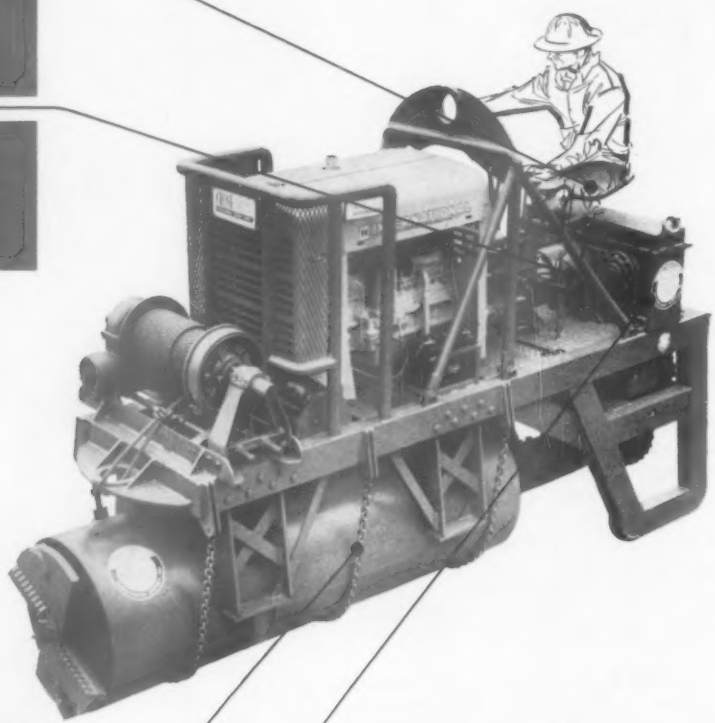

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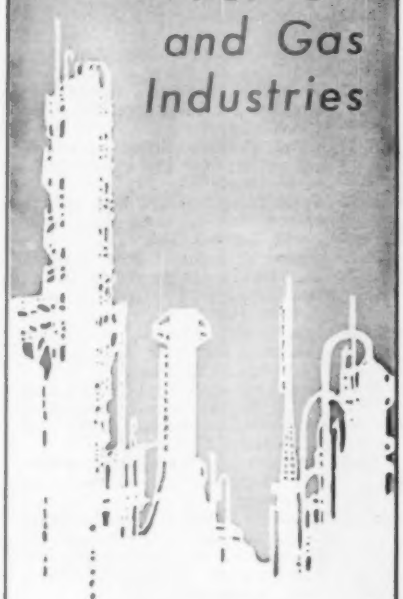

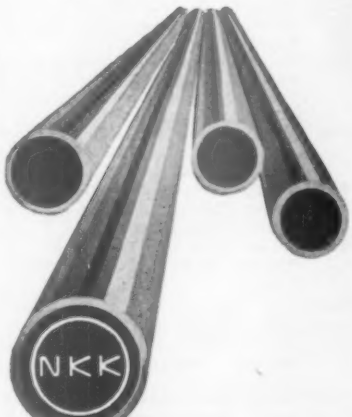

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transfer symposium, Engineering and Industries Building, Gainesville, Fla.

11 American Institute of Chemical Engineers, Sabine area section; American Chemical Society, Texas-Louisiana Gulf section, seventh annual joint technical meeting, Lamar State College of Technology, Beaumont, Tex.

14-18 National Association of Corrosion Engineers, sixteenth annual meeting, Memorial Auditorium, Dallas.

16 Petroleum Equipment Suppliers Association, eastern district membership meeting, Duquesne Club, Pittsburgh.

16-18 American Petroleum Institute, Division of Production, southern district meeting, Hilton Hotel, San Antonio.

18 Natural Gasoline Association of America, Oklahoma regional meeting, Biltmore Hotel, Oklahoma City.

21-23 Midwest Gas Association, annual meeting, Hotel St. Paul, St. Paul.

21 University of Texas, school of gas technology, sixth semi-annual term, Kilgore College, Kilgore. Term ends April 29.

22 Petroleum Equipment Suppliers Association, Gulf Coast district membership meeting, Shamrock Hilton Hotel, Houston.

24-25 New England Gas Association, annual meeting, Hotel Statler-Hilton, Boston.

25-26 North Texas Oil and Gas Association, thirtieth annual meeting, Kemp Hotel, Wichita Falls, Tex.

28 University of Texas, American Petroleum Institute Division of Transportation, school of pipeline technology, eighth semi-annual term, Lee College, Baytown, Tex. Term ends May 6.

28 University of Texas, American Petroleum Institute Division of Production, institute on automatic production controls, first term, Odessa College, Odessa, Tex. Term ends May 6.

28-30 Western Petroleum Refiners Association forty-eighth annual meeting, Hilton Hotel, San Antonio, Tex.

29-31 American Power Conference, annual meeting, Sherman Hotel, Chicago.

30-Apr. 1 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita.

APRIL

3-8 Engineers Joint Council, sixth nuclear congress, New York.

5-6 University of Kansas, eighth annual gas compressor institute, National Guard Armory, Liberal, Kans.

4-7 Oil Heat Institute of America, annual convention, Park-Sheraton Hotel, New York.

4-7 National oil heat and air-conditioning exposition, Coliseum, New York.

5 Petroleum Equipment Suppliers Association, southern mid-continent district membership meeting, Statler Hilton Hotel, Dallas.

5-7 Instrument Society of America, national chemical and petroleum instrumentation symposium, Rochester, N. Y.

7-8 Rocky Mountain Oil and Gas Association, midyear meeting, Newhouse Hotel, Salt Lake City.

8 Chemical Institute of Canada, rubber chemistry division, annual meeting, Kitchener, Ont.

12-14 Petroleum Industry Electrical Association, Petroleum Electric Supply Association, conference and exhibition, Municipal Auditorium, Kansas City.

15-16 Society of Economic Paleontologists

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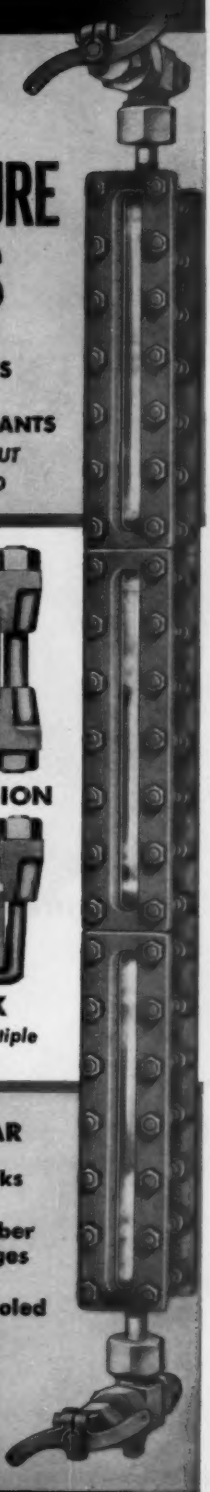
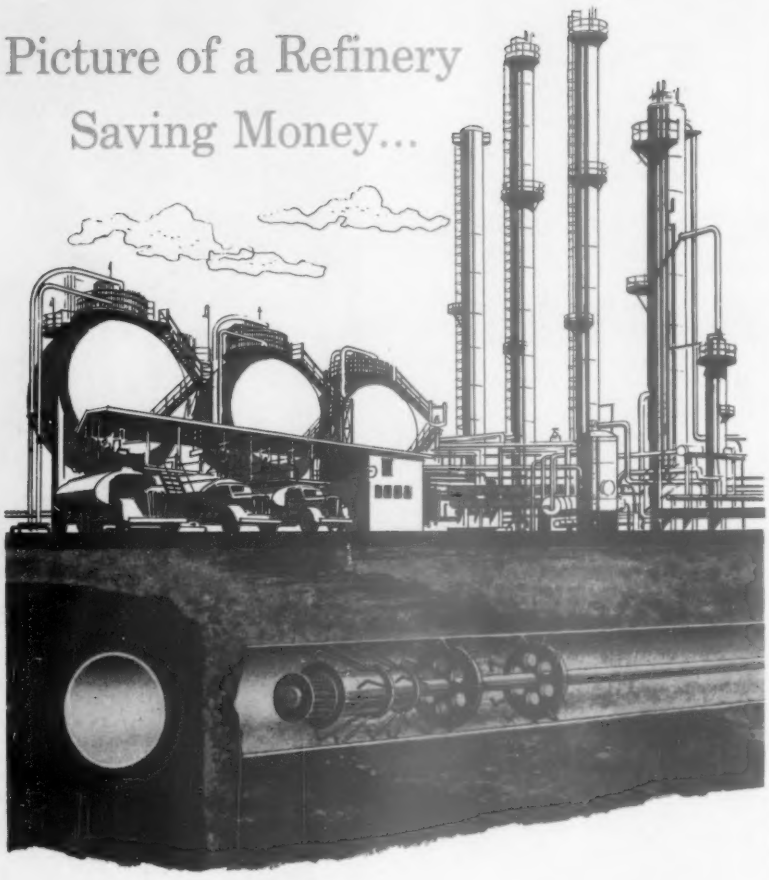


Picture of a Refinery Saving Money...



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and Mineralogists, Pacific section, annual spring field trip, Panoche Hills, San Joaquin Valley, California, and evening meeting, The Hacienda, Fresno, Calif.

19-21 University of Oklahoma, College of Engineering, southwestern gas measurement short course, north campus, University of Oklahoma, Norman.

20 Chemical Institute of Canada, joint meeting, Quebec rubber and plastics group and Montreal section, Queen's Hotel, Montreal.

20-22 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone, Henning, and Townsend hotels, Casper, Wyo.

20-22 National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland.

20-22 Oklahoma State University, technical conference on heat transfer, Stillwater, Okla.

21-22 Texas Technological College, seventh annual West Texas oil lifting short course, Lubbock, Tex.

21-23 Society of Economic Paleontologists and Mineralogists, Permian basin section annual meeting and field trip, Abilene, Tex.

24-26 Independent Petroleum Association of America, midyear meeting, Denver Hilton Hotel, Denver.

25-26 American Society of Mechanical Engineers, maintenance and plant engineering conference, Chase-Park Plaza Hotel, St. Louis.

25-27 Southern Gas Association, convention, Buccaneer and Galvez hotels, Galveston.

25-28 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

25-29 American Welding Society, annual meeting and welding exposition, Los Angeles.

26 Petroleum Equipment Suppliers Association, Pacific district annual membership meeting, Ambassador Hotel, Los Angeles.

27-29 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

28-29 American Petroleum Institute, Division of Transportation, pipeline conference, Mayo Hotel, Tulsa.

28-29 Pacific Coast Gas Association, distribution conference, Benson Hotel, Portland.

MAY

1-4 American Petroleum Institute, Division of Transportation, tanker conference, Seaview Country Club, Absecon, N. J.

2-3 Society of Petroleum Engineers of AIME, North Texas section, fourth biennial secondary recovery symposium, Wichita Falls, Tex.

5-6 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual joint meeting of Rocky Mountain petroleum sections, Calgary.

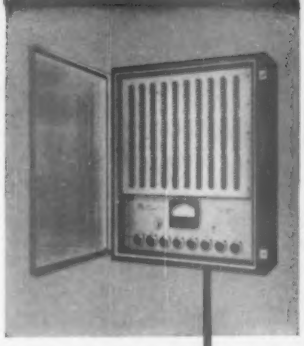
5-6 Canadian Institute of Mining and Metallurgy, annual technical meeting of petroleum and natural gas division, Palliser Hotel, Calgary.

9-12 American Petroleum Institute, Division of Refining, midyear meeting, Statler and Sheraton-Cadillac hotels, Detroit.

9-12 Instrument Society of America, instrument-automation conference and exhibit, Civic Auditorium and Brooks Hall, San Francisco.

9-13 American Gas Association, distribution and transmission meeting, Jung and Roosevelt hotels, New Orleans.

CM-2



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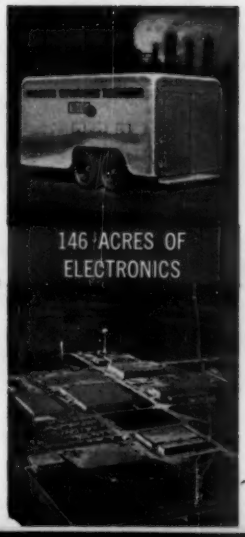

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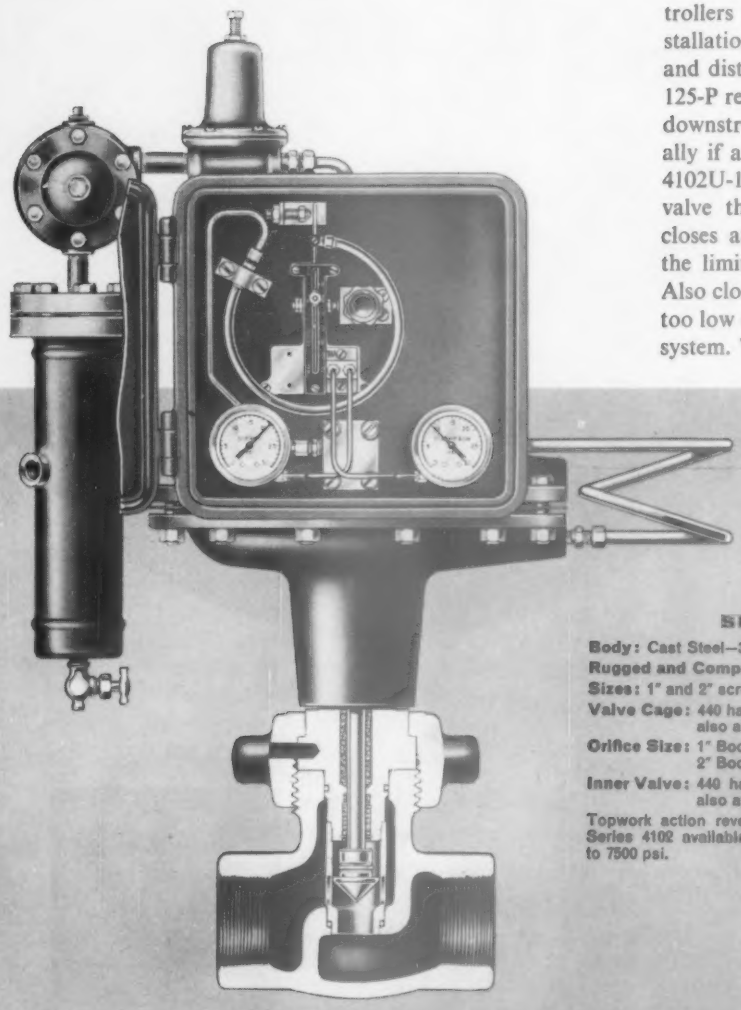

Here are the ideal hi-low cut-out controllers for well-head and flow lines installations and in natural gas transmission and distribution systems. Type 4102UR-125-P reduces or throttles pressure to the downstream system . . . closes automatically if a break in the line occurs. Type 4102U-125-P is a hi-low pressure safety valve that is normally wide open but closes automatically if pressure exceeds the limitations of downstream pressure. Also closes automatically if pressure falls too low due to a break in the downstream system. Write for Bulletin D-4102B.

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50 years ago

February 6, 1910

The Texas Co. buys additional land at the corner of Rusk Avenue and San Jacinto Street in the business section of Houston as a future building site. The corner is opposite the new postoffice building now under construction. Present offices of the company are in the Jones Building on Main Street, two blocks west.

After a season's trial use of oil-burning locomotives, New York Central Railroad decides to go back to coal exclusively for fuel. Company claims oil does not flow readily enough in cold weather, and since coal would have to be burned in winter it would be better to use it all the time.

A new means of fire protection for oil tanks is being provided by The Texas Co. at its Clinton tank farm across the Arkansas River from Tulsa. Six-foot earthen dikes are being thrown up through the farm, checking it off into four sections.

25 years ago

February 7, 1935

Phil H. Bohart, veteran in the service of Gulf Oil Corp. companies, has been made vice president of Gypsy Oil Co. and Gulf Pipe Line Co. with headquarters in Tulsa. He has served as assistant vice president of these companies for several months.

Prolific new Fitts field in Pontotoc County, Oklahoma, takes top spot in Mid-Continent drilling. More than 350 waiting locations virtually assure continuation of active drilling at least 5 to 6 months.

Vulcanized rubber applied to pipe to protect it against corrosion and soil stress is being tried out for the first time on a section of Lone Star Gas Co.'s main line in Ellis County, Texas, between Cleburne and Mexia. Revolutionary changes in pipeline work are predicted if trial is successful.

10 years ago

February 9, 1950

Sunray Oil Corp. negotiates purchase from Atlas Corp. of controlling interest in Barnsdall Oil Co., one of oldest oil companies in the world. Acquisition seen as step toward eventual merger of these companies and dropping of Barnsdall name.

First oil from Mexican-American Independent Oil Co.'s prolific Tortuguero discovery well near southern tip of Veracruz State, Mexico, moves to Minatitlan refinery. Company's first well under contract with Mexican Government flows 5,000 bbl. daily from two zones between 2,000 and 3,000 ft. Large field indicated.

JOURNALLY SPEAKING

To Market, To Market

WE ARE GLAD to see that at least some people in the oil industry are giving thought to developing new markets for petroleum products on their own hook.

For a long time, it seems, oil men have been content to let the growth in the demand for their products depend on the aggressiveness and technological progress of other industries, on the increased mechanization and mobility of an expanding economy, or on just the plain old birth rate.

We'll probably be read out of the lodge for saying this, but in one sense it is close to the truth that the great, proud, expanding oil industry has practically been a parasite, living off other industries and getting a free ride on their advancement.

You bristle at that? Well, who, pray tell, developed a market for gasoline? Not refiners. They used to burn the stuff to get rid of it. And we'll bet oil men laughed as hard as anybody else when they heard that Henry Ford was tinkering with a horseless carriage. Nor have we heard that the oil industry did anything notable toward achieving the goal of two cars in every garage, such as promoting mass production of autos or their mass sale on the installment plan.

Oh sure, the oil industry cashed in on this windfall by building filling stations everywhere and being ready to sell to everybody who asked for gasoline. But aside from giving away road maps it hasn't done anything to promote travel on a par with the enterprise of the old trolley companies in building amusement parks at the ends of their lines.

Oil's second-biggest market is for distillates, still often called "gas oil" because at one time the only use anybody could think of for it was making artificial gas for lighting purposes. Then somebody else invented diesel engines and home furnace burners, and the manufacturers of them promoted their use vigorously and thus opened vast new markets for oil.

The oil industry met these advances halfway by improving its product and supplying the quantities needed by these new markets, but that's about as far as it went. We can't name a single railroad that junked its coal-burning locomotives for diesels because of any missionary work by the oil industry.

Natural gas is perhaps an even more glaring example of the oil industry's failure to develop its own markets. For a couple of generations gas was an unwanted byproduct or stepchild of oil in most areas, and a gas well was considered a greater calamity than a dry hole. Conservation authorities had to force producers to stop flaring it.

Then some manufactured-gas people discovered that natural gas was pretty good stuff, and some steel people developed pipe for its high-pressure transmission, and some investment people laid long lines and promoted its sale. The astonished producers were so pleased at this that some of them practically gave their gas away.

So natural gas was taken over by utility people and was developed and promoted on a public-utility pattern. Now, too late, the producers are unhappy about being taken over by the utilities with their concepts of contracts, prices, and regulation. But it was the utilities, not the oil men, who realized the value of gas, who developed markets for it, and who are selling it at prices below the fuel oil it is displacing.

It wasn't always so. Some early-day oil men did a lot of work in developing better burners and wicks for kerosine lamps and stoves, and in promoting their sale. They even gave away lamps in China to build a market. And when heavy crudes were first discovered in Texas and California the producers vigorously promoted their use as fuel by railroads and steamships.

There are other examples of market development by the oil industry. But, by and large, particularly during the last 30 years, oil men as a whole seem to have been content to let somebody else discover and promote new ways to use their crude oil and its products.

—Henry D. Ralph

Whatta Ya' Mean Too Many Logs?

"Yes, sir, that's right—too many logs!

"You see, today we have over 40 different types of logging services to choose from, so it's no wonder our wells are sometimes "over logged," inadequately logged or logged with the wrong tool. But now we have a new easy-to-use logging program developed by Welex."

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Welex's new easy-to-use logging program is based on four Welex logging services — the Guard-FoRxo, Induction-FoRxo, Radiation-Guard and Radiation-Induction. One of these four services will give fast accurate answers in more than 90 percent of today's wells.

The diagram shown here indicates the right service, based on the type of mud and type of porosity.

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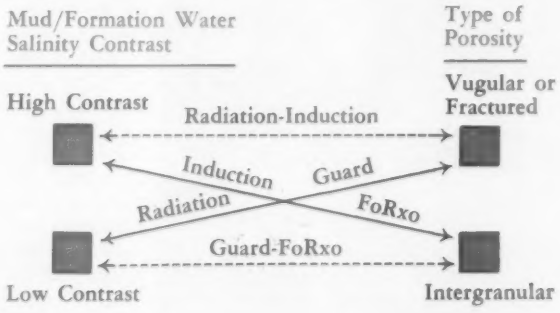

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District offices in every major oil center. Subsidiaries in Canada, and Venezuela.

Aneth is a victory for the scientific approach

A NEW ERA in regulatory practice was inaugurated in Utah last week when the Oil and Gas Conservation Commission ordered 80-acre well spacing in the huge Aneth field.

The decision was not just a victory for one group of companies over another group. It was not just a victory for the advocates of wider spacing in general.

It was a victory for technology; a milestone in the science of reservoir engineering; and—above all—an object lesson in the unprejudiced, scientific approach to regulation.

UTAH IS A YOUNG OIL STATE. Two years ago its brand-new commission, composed of men with no oil or technical background whatever, plunged into the intricacies of reservoir drainage with a determination to base its decision on facts alone.

Today the Utah commission is more thoroughly grounded in production technology than any state commission in the country. Through 42 days of the Aneth hearings the five commissioners absorbed the technical evidence with a patience and dedication that won the unstinted praise of both winners and losers.

Only technical evidence was admitted. No references were permitted to economic considerations, industry practices elsewhere, or even studies of other reservoirs. The only pressures that concerned the commission were well pressures, not political pressures.

No reservoir in the world has ever been analyzed as closely as Aneth. Half a dozen companies on both sides of the spacing issue cored more than 100 wells at frequent intervals, conducted some 50 interference tests, and made hundreds of pressure-drop tests. What was learned is a really significant contribution to knowledge of reservoir behavior, dispelling some long-held beliefs and confirming some disputed newer theories.

On such scientific evidence—and on none other—the Utah commission decided that Aneth field can be produced without requiring the operators to drill some 500 additional infill wells.

AS A RESULT of this action:

- The $5,000,000 not spent in unnecessary Aneth development drilling will be used for wildcatting, chiefly in Utah.
- A precedent has been set for initial wide spacing and making the advocates of close spacing bear the burden of proof.
- Utah is established as a progressive oil state and its commission has a rare reputation for being conscientious, objective, and uninhibited by personal predilections or industry precedents.
- Regulatory bodies of other states may emulate Utah's scientific approach to problems of reservoir control, efficient recovery, and proper well spacing.

LAWYERS fill federal district court in Tulsa as conspiracy trial opens.

Oil's Business Methods Are on Trial

• Entire industry has a big stake in the outcome of the price-conspiracy case now being heard in Tulsa's federal district court. It now looks as if the important verdict will come sooner than predicted.

THE OIL industry's traditional way of buying and selling crude and gasoline came under massive attack last week in Tulsa's federal district court.

Attorneys for the Justice Department left no doubt they are striving to prove business practices—considered routine and normal in the oil industry—actually constituted a conspiracy to fix prices of crude and gasoline at the height of the Suez crisis in January 1957.

These are the impressions gained from the opening rounds of the antitrust battle between the Government and 29 oil companies.

The oil firms are defending themselves against criminal charges of conspiring to fix prices. More important, they are defending ways of doing business from drastic changes which undoubtedly would follow a government victory.

Speedy trial . . . Predictions of a 4 or 5-month trial were revised downward during the first few days.

Both the Government and the defense, represented by a corps of 80 lawyers, waived opening statements and moved quickly into entering on the record a host of stipulated material.

This was followed by admission of scores of documents over objections of oil-company lawyers. Thus, the way was cleared for first witnesses to appear by late in the week.

The Government, led by Joseph E. McDowell, veteran antitrust lawyer of the Justice Department, indicated other witnesses from oil companies would be heard this week. He expects to complete the Government's case by the end of this week or early next.

Oil-company lawyers have indicated their strategy then will be to request time to prepare motions for dismissal or acquittal, arguing that the Justice Department team of lawyers failed to prove the conspiracy charges. A recess probably will be ordered by U. S. District Judge Royce H. Savage while he studies the briefs, evidence, and testimony. Savage is hearing the case without a jury.

The industry can expect a decision from Savage just as quickly as it's possible for him to render one. The judge has exhibited an amazing familiarity with all the pleadings and documents introduced thus far. He is noted for the speed with which he runs his court.

Failing to win an acquittal at this stage will mean the oil companies then individually and collectively would have to introduce evidence and testimony of witnesses defending their business practices. This could be a lengthy process because of the number of companies involved.

The defendants already have lost two attempts to win a early legal victory.

Minutes after the opening, Simon H. Rifkind, a former federal judge and special attorney for Cities Service Co., moved for a dismissal. Truman B. Rucker, special attorney for Sinclair Oil Corp., made an identical motion. Both were denied by Savage.

Rifkind then made a motion that his client be acquitted because the Government in its pretrial brief failed to present sufficient evidence to sustain a case. Savage considered this motion overnight and then denied it.

Judge's policy . . . Savage so far has adopted a generous policy of admitting nearly every document presented by the Government.

In instance after instance objections by defense lawyers were overruled. Most of the objections have been based on complaints the papers or documents are heresay evidence, are the opinion of one person given to a superior, or do not represent corporate policy or action.

Under the relaxed rules governing a nonjury conspiracy trial, however, the judge has wide latitude on admissible matters. He can later reject the documents after the Government has completed its case. Thus, although the controversial documents may be admitted, their relative merit or bearing on the case will be decided later by Judge Savage.

This has led to many amusing courtroom scenes where the government attorney will introduce a document, then point out pertinent sections bearing on the government contention. This is quickly followed by defense lawyers pointing out to the judge other sections in the same document favoring the oil-company cause.

The documents . . . The type of material getting into the record is shown by three examples.

One was a memo written by L. T. Weger, assistant manager of crude-oil purchase and sale for Ohio Oil Co., on January 7, 1957. Weger wrote at the start. "Phillips considers its increase in the West Texas Panhandle at 29 cents a barrel . . . " He wrote later that Phillips does not compete with Humble buyers in the area.

McDowell said the Government would use the document to show that Weger communicated with someone at Humble on the price matter.

Thomas M. Scanlon, attorney for Ohio, derided the memo as an example of the Government's "picking out scraps of papers from which inferences may be drawn."

Another company paper admitted was a weekly letter from R. H. Lindsey, Phillips Petroleum Co. division manager at Houston, to John E. Harris, Jr., Phillips' crude-oil purchases and sales manager. It was a report on pricing activities in the Houston area.

Phillips Attorney R. M. Williams contended the letter was "clearly hearsay" and contained information collected from random sources. Judge Savage, however, admitted the letter, observing it tended to show that Lindsey had communication with someone at Humble about price increases.

A third controversial document was a long memo written by Serge B. Jurenev, assistant to the president and chief economist for Continental Oil Co. Jurenev raised the question whether crude-price hikes were justified in view of inventories and whether they could be maintained.

Judge Savage explained the documents were admitted only against the respective firms, pending independent evidence that would establish a case involving other companies.

The type of documents going into the record and the line of prosecution obviously have defense lawyers nettled.

No surprises . . . So far the Government has pulled no surprises.

And Chief Prosecutor McDowell told the Oil and Gas Journal he plans none. He will follow fairly closely the case outlined in the Government's pretrial brief (OGJ, Jan. 25, p. 117).

The government allegations:

. . . **Representatives** of the defendant companies discussed among themselves a general increase in prices of crude oil and automotive gasoline before the increases wede made in January 1957.

. . . **The price increases** came at a time when stocks of crude oil and gasoline were excessive, hence were not economically justified.

The Government in its pretrial brief admitted it has no direct evidence of their beinga conspiracy but plans to rely on circumstantial evidence. Action of federal lawyers in court indicate this policy will be carried out fully.

Thus far in the trial, the government strategy evidently will be to create an inference of conspiracy by showing communications between defendants prior to the price increase, the increase was uniform, and that economic conditions at the time normally would not support the higher prices.

The defense line . . . The 29 defendant companies first put their side of the case into the record just as the trial opened.

It was contained in a joint trial brief of the defendants accompanies by briefs of individual companies.

The oil companies deny the conspiracy charge. They maintain the price increases under attack resulted from individual and independent business judgments of the defendants. They

Conspiracy trial highlights

- Motions to dismiss, made by Cities Service Co. and Sinclair Oil Corp., at opening overruled.
- Motion by Cities Service, asking judge to order an acquittal for the defendant, denied.
- Stipulations between Government and defense covering technicalities, such as corporate identities, positions in interstate commerce, shares of gasoline markets, pricing of crude, admitted.
- Documents, including telegrams, interoffice memos, newsletters, price bulletins, reports of analysts and economists, admitted over defense objections. Documents will be used by Government to bolster its contention stocks of crude and gasoline were adequate at time of price increases in 1957. Defense contends documents are heresay evidence.
- Written rule, making blanket objections automatic by defendants to any document offered by Government, agreed to by both Government and defense to speed up the trial.
- First witnesses called. They include FBI agents, telephone company employes, and the keepers of corporate records at two oil firms.

VACANT JURY SEATS provide spectators best vantage point at Tulsa. The jury box is available since Tulsa case is a nonjury trial. The jury box and a row of seats in the back of the room are the only space open for spectators. The remainder of the room is filled with lawyers and newsmen. Lawyers are shown here in relaxed huddles during court recess.

add there was no agreement or collusion, expressed or implied, among any of them.

The defense paints this economic background for the price increases: The Suez Canal was closed. The Iraq Petroleum Co. pipeline was bombed in Syria. Burden of supplying Western Europe with fuel fell on the U. S. oil industry.

This heavy extra demand, coupled with no appreciable increase in supply, created the classic economic situation in which price increases normally would be expected. There also had been no price increase in the U. S. since mid-1953. In the meantime, the domestic industry had experienced rising costs stimulated by several factors. These were the forces behind the price increases.

On the issue of uniformity in upward price movements, the defense contradicts government charges.

Industry lawyers point out there was no consistency between the moves by different companies in different producing areas. The price changes varied in amount and times, demonstrating that they were genuinely competitive.

Once crude prices advanced, the natural result would be higher prices for gasoline and other products, especially since cost of crude constitutes about 70% of total refinery costs.

The defense then argues that just because sellers of products tried to recover increased costs by raising prices does not support any inference they acted in collusion.

Later adjustments in prices of gasoline and other products likewise failed to show any consistent pattern demonstrating collusion or conspiracy. They illustrate the competitive behavior of oil-industry pricing.

The conspiracy . . . The defendants answered the Government on the three basic points of the inference that a conspiracy existed in 1956-57.

These points were:

. . . **Public statements** of industry executives.

The defense points out the statements were no more than generalized comments on industry conditions. They were made in the course of reports to stockholders or in answer to questions put by financial analysts or journalists. The texts of the statements and the circumstances under which they were made eliminate the contention they were an invitation to conspiracy.

. . . **Numerous informal** private discussions. This government allegation is drawn from evidence that there had been general public discussion of rising costs and general economic conditions in the petroleum industry. These public discussions had occurred in newspapers, in the trade press, in open meetings, and the like.

The inference is that if an oil executive comments on economic conditions within the industry he must have also had private discussions with his competitors in which they agreed to raise prices. The defense brief acidly maintained "this kind of logic requires no refutation."

. . . **So-called face-to-face** meeting between two oil leaders on prices. The defense points out the face-to-face meeting was between the chief executive of one company (Jersey Standard) and an executive of one of its subsidiaries (Humble).

The Government also relies heavily on numerous telephone talks between representatives of the defendant companies during the period in question. The defense contends the Government has no evidence of what was discussed. Normal day-to-day business in the oil industry is carried on in large measure over the telephone. Just because conversations occurred during the price-increase period does not support any contention of conspiracy.

The defense set-up . . . The courtroom presents an unusual appearance.

The spectators' benches have been moved out and tables set up to accommodate the battery of lawyers representing each defendant. Only a few seats for observers line the walls.

The out-of-town lawyers have opened offices in buildings and hotels near the Tulsa federal building. Secretaries maintain liaison between the offices and courtroom.

The opening days of the trial received wide news coverage. A special press room was opened in the World-Tribune newspaper building a block from the courthouse. The defense sent over to the press copies of its briefs, pleadings, and documents. Government attorneys also made themselves easily available for news conferences.

Both sides appeared deadly earnest in their efforts to win the fight inside the court room and win public opinion on the outside.

Aneth Sticks With 80-Acre Well Spacing

• Utah Conservation Commission's decision—ending 2-year controversy—may mean less development drilling in Paradox basin this year. Shell was the only company plugging for 40-acre spacing.

IT'S TO BE 80-acre well spacing for the Greater Aneth field in southeast Utah.

The Oil and Gas Conservation Commission reached this decision within a few hours after concluding a marathon well-spacing controversy which started in the fall of 1957. The formal order—upholding the pattern under which the 500-well field has been developed—will be issued on February 24.

In the memorandum opinion issued on January 30, the commission concluded that the pressure history of the field demonstrates it is being efficiently and economically drained by 80-acre spacing. Continuing, the opinion stated:

"The evidence shows the various leases of oil and gas are large enough in size that a density of one well to 80 acres will, with insignificant exceptions, pierce the various layers and provide efficient and adequate vertical communication.

"While there are varying permeabilities with the pay sections, the so-called barriers of low permeability are not continuous and do not completely surround and isolate oil and gas."

Shell the loser . . . Shell Oil Co. was the only Aneth operator in favor of 40-acre spacing.

Gulf Oil Corp. originally asked for 40-acre spacing but just before the hearing was concluded a spokesman asked for 80 acres. Texaco Inc., Carter Oil Co., Phillips Petroleum Co., Continental Oil Co., and Superior Oil Co. carried on the battle for wider spacing.

To back its contention that the heterogeneous reservoir would support 40-acre spacing, Shell last year drilled five infill wells.

The commission did not touch on the status of the infill wells in its memorandum opinion but the wells were drilled under the condition they would not result in increased oil-well production from any 80-acre tract.

Effect of ruling . . . Had the commission ruled for 40-acre spacing, the effect would have been to touch off a drilling spree in which as many as 400 infill wells would have been added.

Continuance of 80-acre spacing at Aneth will probably result in less development drilling this year in the Paradox basin, barring any major discoveries in the near future.

There are probably less than 50 proved locations to be drilled in the Greater Aneth field. Last year's crop of oil discoveries in southeast Utah led to little development drilling but prospects have brightened in the past 2 months.

Houston, Tulsa Firms Going Merger Route

UNION Oil & Gas Corp. of Louisiana and Texas Natural Gasoline Corp. are joining forces to form a new Houston-based company that will be strong in both crude and LPG production and eventually move into petrochemicals.

The merger is subject to stockholder approval of the two companies March 3.

Union, a Houston company, has 15,100 bbl. net daily crude production, 245 million cubic feet daily gas production, and large holdings throughout the Western Hemisphere.

Texas Natural, a Tulsa company, owns seven natural-gasoline and LPG plants producing about 1 million gallons daily.

The new company will be known as Union Texas Natural Gas Corp. The president will be Richard T. Lyons, president of Union. The executive vice president will be John T. Oxley, president of Texas Natural.

Under the proposed merger, stockholders of Texas Natural will receive one and one-eighth shares of Union stock for each share of Texas Natural stock. Union stockholders will retain their present stock.

In the exchange, Texas Natural stockholders will receive 0.75 share of Class A nonvoting stock and 0.375 share of Class B voting stock in the new company.

The new company will have 12 directors, of whom nine were directors of Union and three of Texas Natural. Those from Texas Natural will be Oxley, Frank M. Engle, and Roger S. Randolph, all of Tulsa. Those from Union will be Lyons, William A. M. Burden, New York, who will be board chairman; Mark J. Millard, New York, who will be chairman of the executive committee; and Charles B. Harding, John L. Loeb, Thomas McCance, H. Harper McKee, Frank F. Russell, and R. McLean Stewart, all of New York.

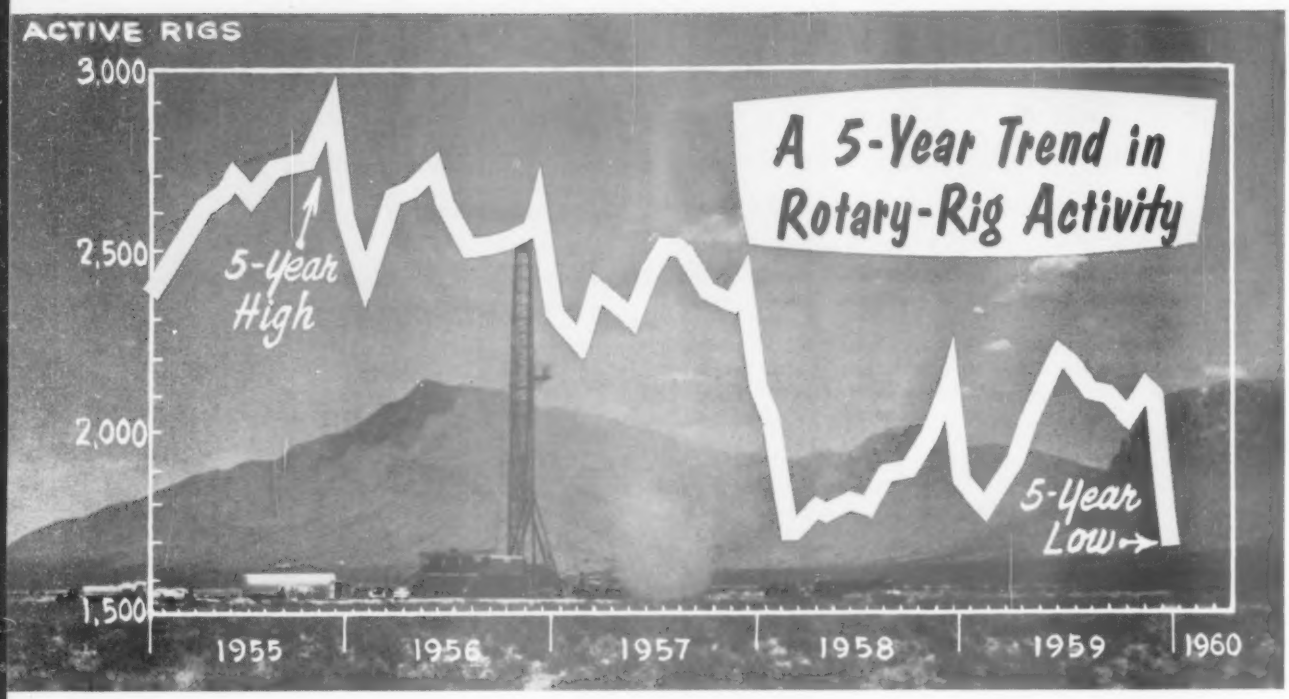
Union's principal production is located in South Louisiana. It has considerable undeveloped acreage in Louisiana, Texas, the Rocky Mountains, Bolivia, and Argentina.

Through five subsidiaries, Union has interests in South America, Louisiana, Texas, and California. Unola de Argentina, Ltd., has producing rights in Argentina. Union Petrolera Venezolana, CA, has producing properties in Lake Maracaibo's Marlago field operated by San Jacinto. Union Petrolera Boliviana, S. A., has producing rights in Bolivia. Runnels Gas Products Corp. has gasoline and LPG plants at Eunice, La., and Sykes, Tex. Union Offshore Corp. has exploratory interests in California.

Texas Natural, a 12-year-old company, owns seven natural-gasoline and LPG plants in Texas, Louisiana, and Montana. Also, it owns or leases more than 1,400 LPG tank cars and about 3.45 million barrels of underground storage capacity.

Texas Natural has about 650 employes and Union about 425.

A Union spokesman said the merger is considered a natural for both companies because they can combine their specialties into a more integrated company, a trend developing in the industry. He said it definitely puts the new company in a position of entering the petrochemical field.



Why Drilling Is Slow to Pick Up

• The industry is still looking for a fair year, despite a 13-year low in rig activity. Operators tell Journal editors the slower-than-usual start is due in part to tight money, longer payouts, and switch in emphasis from development wells to wildcats.

THE DRILLING industry is off to one of its slowest starts in any year since World War II.

Most executives in the business had predicted a fair year for drilling—and they still think so. But their predictions hardly were made before the number of active rotary rigs across the country plunged to a 13-year low in mid-January. Well completions also dropped sharply.

Why this failure to get started in 1960? Executives contacted by Oil and Gas Journal editors report operators are just in no hurry to drill because of:

. . . Low per-well income. The payout is slower on investments in wells these days. Crude prices also aren't too firm. Generally low allowables have added to the feeling of pessimism and uneasiness.

. . . Tight money. The shortage of money to lend and higher interest rates are being felt in many spots.

. . . The time of year. Oil operators, especially the independents, traditionally sit tight on drilling during January and February.

. . . Adjustments in drilling programs. More emphasis is being put on wildcatting, wider spacing, deeper wells—all adding up to need for fewer rigs.

The drilling executives, with only a few exceptions, say the lack of rig activity is not due to any steel shortage or bad weather in the oil country.

Unhappy economics . . . Oil operators nearly all report they plan about the same number of wells for 1960 as they drilled in 1959.

Drilling contractors say bid activity now is beginning to pick up. They feel sure the industry will stir itself this month and a definite improvement will be noticed.

As for a reason for the drilling slump, the contact man for one large Mid-continent contractor observes:

"We get a different story everywhere we go. Some operators have the acreage but plead no money. Others have money but plead no acreage. I think that low allowables, especially in West Texas, are a major factor.

"Everyone is bidding so close these days it's hard to get a job when one opens up. There always is someone who either made an error in his bidding or is willing to forget depreciation and work for less than his true cost."

A Tulsa drilling-company executive reports:

"I've just finished a swing around the oil-company offices. From my impressions, I'd say there is plenty of work in the mill but the companies just aren't ready yet to put rigs to work.

"Two factors are aggravating the usual lull at the first of the year. We have run into many new drilling units being formed or unitization deals being considered. It takes a long time to get these organized and completed be-

fore the operator can ask for bids and get a drilling program started.

"Also, this move to wider spacing is pinching down the number of wells required. The operators, however, keep telling us they plan the same number of wells this year."

W. L. Kendall, director of the oil-loan department of Tulsa's First National Bank & Trust Co., gives this explanation:

"We had a real flurry of drilling in December—above 2,100 rigs active—operators were drilling up their budgets getting intangible drilling expenses on their books for tax purposes. That could explain work for 200 to 300 extra rigs.

"Now the operators are slow in starting up their 1960 programs. This is especially true of the large and small independents. They traditionally do very little in January and February. They are prone to study 1959 business, plan the new year, and see where they are.

"Many independents also are more prone now to delay drilling unless they are forced by offsets. They don't need development wells normally because with low allowables and the general oversupply, the low volume of crude they can run gives too slow a payout on well costs.

"Tight money is a very minor factor in my opinion. If an operator who has been paying 5 to 5½% for money can't pay 6%, he is in the wrong business. Money is tight but we've been able so far to take care of our regular customers—but we're not taking on any new ones."

New trends . . . Two drilling executives report a new trend may be setting in.

Jack Abernathy, president of Big Chief Drilling Co., Oklahoma City, observes:

"We may be settling down to a cyclic adjustment in the drilling business where the average will be somewhere around 2,000 rigs active.

"This will mean a sharp downturn in rig activity the first part of the year with a corresponding—I hope—sharp increase later.

"This adjustment naturally is aggravated by normal slowness of operators to start spending their budgets at the start of the year, also by the weather, readjustment of exploration budgets between parts of the country, and other factors."

Sam Brown, contract representative of Helmerich & Payne, Inc., Tulsa, has another explanation:

"We're getting more mature in this business and with that comes an awareness of just how much time it takes to spend so much drilling money. The operators know they can wait awhile early in the year to see how things are going and still spend all their budgeted funds for drilling. They also know there's a surplus of rigs and they are pretty certain to get a rig whenever they do decide to start spending.

"The impact of these things is greater at the first of the year. Such psychological factors as fear and caution play more of a role then than you might imagine."

He adds that bid activity picked up recently, indicating an upward turn may be near. "We think that the drilling business will be about what it was last year and you'll see a definite upswing this month," he says.

West Texas hurt . . . Drilling contractors working in that area have been hit hard by the lull. One big operator with 21 rigs available has had them all idle for weeks. Another has had two of nine working, another one of twelve, and a third two of twelve.

Apparently what's happening is this: The major operators are reapportioning their drilling budgets. They've decided not to drill so many development wells this year in West Texas. Instead, they may spread the money more into wildcatting efforts in Mississippi, Louisiana, South Texas, and East Texas.

One drilling contractor predicts development drilling will be off this year over the country and wildcatting up. With this switch may come a smaller number of wells because of higher costs and greater depths required on wildcats.

Two well-known Houston independents blame low income caused by tight allowables and soft crude prices for the lack of enthusiasm in drilling.

The spokesman for one Texan frankly says:

"We're having trouble selling our allowable oil in Louisiana. We have taken several cuts in crude prices. These prices are not always shown in the posted prices. A lot of cuts are between two operators and some of these run from 15 to 40% below postings. The allowable may be fine—when you can sell the oil."

The result is that the independent operator thinks twice before he sinks a new deep well in Louisiana where the costs may run from $90,000 to $100,000 per month.

The Houston operator says that tight money adds to the independent's general problem. Banks, he says, now won't lend as much money on a given property as before. Banks also tend to place strings on the loans now. They want to check back in 30 to 60 days to see if the operator is staying within his budget. A year or so ago the banker's attitude was: "Here's the money. Come back when you need some more."

A second Houston independent is switching his drilling emphasis. He completed most of his development work last year and plans a reduced program of wildcatting this year. He says the problem nation wide, however, is basically one of income.

"When you have 8 to 10 days of production in Texas for 2 or 3 years, it has a cumulative effect. It didn't hurt too much at first, but now this lowered income hurts more and more."

The real meaning of this drop in income is that payouts are so much slower. Usually it takes 3 or 4 years and in some cases 5 or 6, where in the past an operator could look forward to getting back his investment in 2 years.

Dallas independents agree the basic drilling problems are low allowables and unlikelihood of any price increases. One adds too that there is a growing lack of good drilling prospects. Another reports that connections are harder to get for operators who do find new oil.

The majors' outlook . . . Most majors plan no cutback in drilling, but report some slowness in starting off the year's program.

Several say their budgets were approved only in the first part of January and they haven't started on the new program. Only one major reports it is ahead of its 1960 program—and this is due to a development program in Mississippi.

Only one major reports that lack of tubular goods stemming from the steel strike is a factor. Others say they have or can get all the steel they need. Bad weather also is discounted, except in isolated areas in Illinois, Kansas, Oklahoma, and the Rockies.

The majors nearly all expect to get their drilling programs in full swing by March.

Some drilling economics . . . Contractors generally give this rundown on their own problems:

Footage prices have levelled off and now appear pretty stable.

Wage rates probably will stay set this year. Contractors just can't increase salaries and they believe most of the workers realize this.

Cost cutting has reached the point of no return. About all possible has been done with muds, bits, and rigs to lower the contractors' cost of doing business. Tighter and closer supervision and management may show some economy returns, but after that, many contractors believe they've done about all they can to drill cheaper.

TIME-LAPSE photomicroscopy of a simulated reservoir rock is explained by R. L. Overhuls, assistant project engineer. Left to right are Robert L. Stott, of Wagner, Stott & Co.; P. C. Spencer, Sinclair board chairman; Robert W. White, of Robert White Associates; and H. Jeffries, Sinclair executive vice president.

Cost Cutting by Scientific Discovery

• That's the new goal of Sinclair, and its production laboratory last week showed the directors its success in thermal recovery, development of new oil-finding tools, and a new approach to increasing water-flood efficiency.

SINCLAIR Oil Corp. is shifting its cost-cutting emphasis.

It still hopes to achieve "profits through thrift," but it will look to its research laboratories for its major economies in the future.

"There's a limit to what you can do by cutting operating costs," P. C. Spencer, Sinclair board chairman, told a Tulsa press conference last week. The pressure is growing to develop ways of finding and producing oil more cheaply. It is in this area, he said, that Sinclair hopes to make big strides.

Spencer and other Sinclair top executives, together with directors of Sinclair Research Laboratories Inc., toured Sinclair's production-research facilities in Tulsa last week. Here are some of the things they were told:

...Thermal recovery has been proven in the field as an excellent secondary-recovery method. The company's Iola, Kans., project is recovering an estimated 75% of original oil in place, compared with an expected primary recovery of less than 5%. And indications are that the reservoir is being swept clean.

...A new "suitcase" seismic instrument shows great promise for mapping structures shallower than 2,000 ft. It gives a good picture of thin sands and pinchouts in shallow zones normally skipped by seismic instruments.

...An electrical prospecting tool is undergoing experimental field tests. Its developers are hopeful they can pinpoint water-oil contacts and faults.

...A plugging agent has been developed which will seal fractures in formations being flooded and prevent channeling of the water. Sinclair's technologists also have perfected a technique for pinpointing the location of the fracture and injecting the plugging material—an undisclosed plastic—at that precise point.

Underscoring the new emphasis on research, the Sinclair directors elected Dr. George H. Fancher vice president in charge of production research.

Fancher has been chairman of the petroleum engineering department of the University of Texas since 1956 and has been with the university since 1935.

He also has been director of the Texas Petroleum Research Committee and has been active in developing core-analysis methods, a process for low-pressure cracking of heavy oils, and a standard method of measuring permeability.

1. Thermal Recovery

Sinclair figures its first big venture into thermal recovery has been more than satisfactory.

It is operating two rows of input wells feeding three rows of producing wells in a shoestring Bartlesville sand near Iola, Kans. It ignited its combustion fronts in the fall of 1956.

Since then, its studies indicate the

CORE DISPLAY is studied by L. H. Miles, assistant project engineer; W. M. Flowers, president of Sinclair Research Laboratories, Inc.; Dr. George H. Fancher, newly elected vice president in charge of production research; and P. C. Spencer.

NEW 48-TRACE seismic truck being built in this section of the lab is described to P. C. Spencer by D. C. Bowman, assistant project engineer.

fronts have produced a complete sweep of the reservoir areas surrounding the inputs and have stepped up production dramatically. On the basis of results to date, Sinclair expects to jump total recovery from less than 5% of the oil in place by primary means to roughly 75%.

Here are some of the things it has learned:

...Produced crude is identical to that originally in the reservoir. Only when the combustion front comes close enough to the well bore to indicate the well will soon be dead does the well produce cracked products and other unusual fluids.

...Biggest problem is keeping gas and air compression costs to a minimum. The volume of air and casing-head gas injected to feed the combustion front is "many times" the pore volume of the reservoir.

...The technique is promising in fields other than those containing highly viscous crudes. Sinclair's is "poor" in heavy-crude reserves and is looking at thermal recovery primarily for other fields.

...By the time the heat wave reaches a producing well, production in that well is just about over. The producer might as well be plugged.

The project . . . Sinclair for its field study chose a narrow Bartlesville sand stringer in Humbolt-Chanute field.

The reservoir, discovered in 1952, is about a mile long, from 400 to 600 ft. wide, and from 6 to 20 ft. thick. Average thickness is about 14 ft. Depth is about 825 ft. Oil gravity is 24°, and viscosity ranges from 60 to 70 cp.

Sinclair ignited its first well in mid-1955 and experimented for several months with igniting techniques. Its two major fire fronts were ignited in the fall of 1956 and are still expanding. The company figures the project is still in the development stage.

Injection pressure is being maintained at about 950 psi., which Sinclair figures is about 25 psi. less than the overburden pressure.

There are five rows of wells—producers on the end and center rows, with input wells between. The rows are 400 ft. apart, and the wells in each row are 150 ft. apart.

Sinclair has operated as many as 12 input wells at various times, but now has 5 inputs and 11 producers in its long-term study.

2. Selective Plugging

Sinclair technologists feel they have come up with a winner in developing a liquid plastic they can solidify in a formation fracture.

It plugs the channel and prevents the injection water from bypassing the oil.

Sinclair took advantage of early research in the Penn Grade area into the problem of fixing the specific point of channeling in a well. The company has improved the technique to a point of practical field use.

To locate the point where channeling occurs, researchers injected fresh water down the annulus of a well and salt water down the tubing. The heavier salt water would rise to meet the fresh water at the point of channeling. The scientists then would detect the interface between salt and fresh water with an electrical probe.

Since locating the problem was not enough, they turned to the job of developing a sealing material. Hundreds of materials were tried—from ground-up comic books to horsehair—before the plastic was discovered.

Sinclair will say little about the plastic except that it is a liquid which can be premixed with a triggering chemical in such a manner that it will solidify at a predetermined time.

To use it in the field, a crew lifts the tubing to the point of channeling, injects a slug of plastic, follows this with salt water, then squeezes the plastic into the fracture, where it solidifies.

Bruce Grant, manager of the laboratory, said Sinclair Oil & Gas Co. is using the technique now in the field. The method also was licensed recent-

TINY SEISMIC TOOL is displayed by Al C. Reid, project engineer, and Lester J. Smith, junior development operator. Sinclair designed the suitcase-size instrument to get a better view of thin sections above 2,000 ft. Says Reid: "It's like looking at a football game through a telescopic lens."

ly to Mac Colt, Kansas water-flood operator, and other licensing proposals are being considered.

The new selective-plugging technique was developed by R. O. Perry, head of the water-flood research group, and Don Holbert.

3. Exploration Tools

The visiting Sinclair officials were shown a suitcase-size seismic instrument and an experimental model of an electrical prospecting tool. They were also told that the lab is now building the company's second 48-trace seismic recording truck.

Miniature seismic gear . . . This unit is a portable 12-channel unit designed to study shallow structures usually bypassed by conventional instruments.

Sinclair says tests indicate it can pinpoint sections 4 ft. thick or less, sand lenses, and pinchouts above 2,000 ft.

J. F. Johnson, exploration research director, says the equipment can be carried easily by two men. It requires a conventional shot hole, but in terrain too rough for truck travel, these can be drilled by hand auger or portable drill.

The unit also can handle deep seismic work if it is changed from its 50-160-cycle frequency to the 25-50-cycle range.

Electrical prospector . . . This "controversial concept" is being tested in the field to determine whether it can come up with repeatable results in locating oil-water contacts and faults.

Sinclair has an experimental model which has been truck mounted for field experiments.

The power source is placed on the ground in the test area. The recording truck tows behind it the receiving antenna which picks up reflections.

The model's developers are hopeful they can pinpoint oil-water contacts repeatedly as the truck moves in the area of the power station. They have found they can record reflections with a truck speed of 15 m.p.h.

Sinclair feels that while electrical prospecting is "controversial," it should not dismiss the concept casually and will continue to examine the technique's possibilities.

New recording truck . . . The company has had one 48-trace truck in the field for some time and is building a second.

The first truck, Sinclair said, increased the coverage of its seismic crew by 60%.

4. Research Philosophy

Spencer said the increasing pressure of the industry's economics is forcing companies to devote more effort to research.

"We've known for a long time," he said, "that this is something we should do. A positive program is now being forced on us by changed economics."

Sinclair, he said, already is economizing to the utmost, "and our competitors are not far behind, if they're not already ahead of us."

There's a limit to what can be done by cutting operating costs. So, he concluded, the big challenge and the big opportunities lie in scientific breakthroughs which can substantially cut the cost of finding oil in the first place and of producing it after it is found.

In addition to applied research, Spencer said Sinclair is not doing enough fundamental research, "nor is the rest of the industry."

He is confident, he said, that the scientific breakthroughs will be forthcoming. They have already come in refining, in long-distance transmission of large volumes of natural gas, and in other industry problems. When the need became great enough, he said, the industry's scientists provided the needed solutions.

"It will happen in exploration and production, too," he said.

Canada to Aid Northern Oil Hunters

PROPOSED federal regulations designed to encourage exploration and development in the Canadian North are under study by the Canadian Government.

Progress toward outlining the regulations was reported during meetings in Ottawa between government and Canadian Petroleum Association representatives.

Alvin Hamilton, Northern Affairs Minister, said the proposals—which require further study—are aimed at keeping the cost of exploration as low as possible.

Proposed regulations would provide that land would not be put up for auction. Instead, companies would apply for exploration permits, pay a nominal fee, and go to work. They would be required to spend $3 per acre over a 12-year period in the Arctic, compared to $3 over a 9-month period in the territories.

The government also is considering wider well spacing, permitting companies with leases to retain an entire field for its own development instead of turning back half the land for sale to the highest bidder, and a leasing period of 21 years.

The government is proposing another move to make the going easier for Canadian firms—amending tax laws governing depreciation on oilfield equipment.

Cosden Stock Sold

. . . to Grace in what may be first step of merger.

W. R. GRACE & Co. will be in position to expand its role in the manufacture of petrochemicals as a result of its acquisition of a controlling interest in Cosden Petroleum Corp.

Grace disclosed last week that it had bought 1,580,000 shares of Cosden common at $25 per share, giving it slightly more than 51% of the outstanding Cosden stock.

When it made its offer for the Cosden stock in mid-January, Grace said that it had no plans for an immediate merger but did admit that the step could lead to one.

Grace now produces ammonia and urea at Memphis, Tenn., and high density polyethylene at Baton Rouge, La. It also has a minority interest and a management contract in an ammonium sulfate and urea plant planned for Trinidad.

Cosden, an integrated company operating in West Texas, has up-to-date refining capacity of 40,000 bbl. per day. It has been developing the production of benzene, xylene, toluene, styrene monomer, polystyrene, polybutene, ortho-xylene and paraxylene for several years. Thus its petrochemicals could supplement those now produced by Grace.

Scouting Service Offered

A COMMERCIAL scouting company, proposing to handle work now done by the Wichita and Liberal checks in Kansas, is offering services to companies for a $1,000 monthly fee each.

Owner and manager of Well Scouting Service, Wichita, is Robert E. Sink, Wichita. An estimated 15 companies will be needed to support the service.

Forty oil companies now maintain 42 scouts in the two checks. Seven majors have scouts in both Wichita and Liberal checks.

Well Scouting Service proposes a staff of 13 people, six field scouts, and an office force of seven to assemble, process, and distribute scouting data.

One other such service now is operating in the Rocky Mountain section (OGJ, Aug. 3, p. 44) and another commercial service is expected to begin operation soon in West Texas and eastern New Mexico. (OGJ, Aug. 24, p. 47).

watching WASHINGTON

Clyde La Motte

• One way to reach the public . . .

A MAN in Washington has an idea for a television program that might appeal to the oil industry. It would feature leaders from industry, business, and labor who would be questioned as to their views on major issues of the day as well as on matters affecting their own industry.

The theme of the program would be "A Citizen Speaks Up." The format would be somewhat like that of such interview programs as "Face the Nation" or "Meet the Press." It would differ chiefly in this respect: It would feature nonpoliticians.

A panel of reporters, perhaps including one or more from the same industry as the guest speaker, would fire questions at the guest. For the most part, these would be the sort of questions an average person would ask if he had the opportunity to sit down with the industry representative himself.

The thinking behind the program idea is this: There are many public issues in which the average person has some interest because he feels he is affected directly or indirectly. In many instances, however, his knowledge of a particular issue is sketchy at best.

For example, the average person is likely to be pretty much in the dark about such petroleum industry topics as percentage depletion, natural-gas legislation, or oil import controls. Most persons, even those who are well read, have only a foggy notion of the key elements of those issues.

Would the public listen to an industry speaker, knowing that he was directly involved in any issue relating to his industry and therefore likely to have some bias?

Well, the public listens to a candidate or to the chairman of the political party, when he appears on one of these interview programss, knowing full well that the replies of the person being interviewed will be carefully tailored to the best interest of his candidacy or his party.

Furthermore, the questions to be put to an industry or a business leader could cover issues outside his field. In such matters of general interest, the public might be inclined to give even more weight to his replies than to those of a politician.

• Oil men can speak as citizens, too . . .

THERE IS a growing feeling among many in the business community that they must take a more active role in public affairs. This means participation in politics, and in such public issues as taxes, schools, the nation's highways, and other matters at local, state, and national levels.

It has long been recognized within the oil industry (and in other industries to a greater or lesser extent) that one big problem is that oil men tend to talk to each other about public issues affecting them instead of doing their talking where it would do more good—to the public.

It is not enough, for example, for the oil industry to convince itself that natural-gas producers should be freed from strict federal regulation. The general public must be convinced, too, or Congress will be slow to act.

A TV program along the lines outlined might help. Certainly it could reach a vast audience, thus providing the opportunity for the industry to make itself and its problems better known and better understood.

There would be pitfalls, of course. No single person could claim to be speaking for the industry, or even for any large segment of it. The views he would express on a program would necessarily be his own.

But it stands to reason that the industry has men of sufficient stature, knowledge, reasonableness and understanding that their views would—on the whole—be of benefit to the industry. And to the public.

It might be worth a try.

Importers Lay Problems Before Board

• All the questions growing out of the mandatory program are being aired in Washington. They boil down to one thing—some firms want bigger quotas.

• Some decisions made by the appeals board are also certain to be tested in court in an effort to determine just how much control Government has.

WITH THE shakedown cruise of 1959 ended, the Oil Import Administration is now facing the first really stern test of its program for allocating quotas for imports of crude, unfinished oils, and oil products.

The challenges are in the form of petitions filed by companies requesting alterations in the program. The Oil Import Appeals Board is holding public hearings in those cases in which the petitioner requested such a hearing.

Basically, the petitions fall into two categories: A request for a change in crude allocations, or a request for a new or increased allocation for finished products.

Since the 1960 program for crude allocations has not been changed basically from the procedure followed in 1959, the petitions challenging this part of the program are likely to have tough sledding.

In most cases, the crude-oil appeals are the same, or similar to, previous appeals already made to the board—and turned down.

There is speculation, therefore, that the chief reason why some of the companies are filing appeals now is to set the stage for possible court action later.

That is, if their appeal is turned down by the board, they can then go to court, saying that they exhausted all efforts to get relief through established administrative procedures and now have no recourse except the courts.

Newcomers a problem . . . One bitter complaint made by some of the historical importers is that the assigning of quotas to inland refiners who never before imported crude is tantamount to confiscation. The argument of the historical importers is that import quotas should be divided among those who were importing before the controls program was applied.

However, it is unlikely that the appeals board will consider that it has the authority to make changes in the basic nature of the program. Therefore, if the companies want to press the matter further, their only recourse appears to be the courts.

The picture is somewhat different, however, regarding newcomers to the products import picture.

A presidential proclamation last December specifically authorized the Oil Import Administration to consider hardship appeals of companies who have had no product import quota because they were not product importers during the base year—1957.

This obviously opens the door to newcomers. Just how wide that opening is, however, is a touchy matter for the appeals board to decide.

The board members are no doubt aware that if they hold the lid on too tightly, they will be accused of virtually nullifying the presidential proclamation.

At the same time, if they open the door too wide, this would either increase the flow of product imports substantially or companies who are already in the program would have to be cut back sharply to make room for these newcomers. This, too, would generate a great deal of heated controversy—and possibly court tests.

Scope of hearings . . . The outcome of the appeals, and of any court tests which may follow, obviously could have a wide impact on all segments of the industry since production, refining, transportation, and marketing could be affected.

Clearly, it is a tough row the appeals board faces.

First, it will have to hold about 30 to 35 hearings (not all of the 50 petitions filed requested a formal hearing).

These hearings, which got under way last week, will continue at a rate of 10 to 12 a month. Thus, it will be the end of April or early in May before they will be concluded.

However, the board will probably begin handing down decisions before that time, starting perhaps in March. From these early decisions, some indication of the board's pattern may become evident.

It is not only the number of hearings involved that makes the board's job a big one, but the variety of issues which are raised in the petitions.

Some of these issues are broad and far-reaching, while others are small, but extremely knotty.

Some have international aspects because of production commitments in foreign countries.

Some affect refineries—new refineries, refineries destroyed by fire, or refineries that were closed down by strikes during part of the base year of 1957.

Some affect marketing—the loss of markets to competitors who have larger quotas, or the loss of a marketer to shop for suppliers because he has no import quota of his own and thus is at the mercy of the supplier.

First appeals . . . Patchogue Oil Terminal Corp. of Brooklyn, the first of the new appeals to be heard by the board, raised the question of being a "captive customer."

It purchases substantial quantities of residual fuel oil for the East Coast markets (1,780,000 bbl. in 1959). These purchases are made in cargo lots delivered by tanker. Almost all of it is from foreign sources.

However, Patchogue Oil was not an importer of record during 1957 and therefore does not have a quota. Instead, the quotas for the oil it buys is held by its supplier.

The pinch, for Patchogue, is that by thus being tied to one supplier because of the quota provision, it has no flexibility to shop around for better prices from other suppliers. In fact, it says, its supplier knows it has it over a barrel and is hiking the price to Patchogue for 1960 deliveries.

Patterson Oil Co. of Philadelphia, another cargo buyer, claims that it is having to pay higher prices for residual fuel because it has no quota.

Patterson claims that it was offered a cargo of No. 6 residual at $1.70 a bbl. if it had a quota. Since it had no quota, it had to shop elsewhere and wound up paying $2.09 a bbl.

"Thus we had to pay almost 40 cents a barrel more than our competitors who have import quotas," Patterson complains, "and that's not fair."

But the shoe can be on the other foot. Sun Oil Co. has no quota for residual fuel oil even though during

1957 it did import Canadian residual for two companies with terminals along the Great Lakes. But because these buyers were made the importers of record, they got the quotas and Sun got none.

Those are only a few of the problems the appeals board faces.

Gulf Oil Corp., which was also heard last week, challenged the standards by which the Oil Import Administration distributed product quotas to established importers.

It claims that by restricting each company to the amount it imported during the base period, the OIA has "frozen" the product import situation without regard to changing circumstances of individual companies involved.

Gulf contends that a fairer way would be to assign quotas on the basis of product sales made by qualified importers in 1957. As things stand now, the company points out, some firms with a relatively small share of the domestic market have gotten a relatively large share of product import quotas simply because they imported large quantities in 1957.

Gulf feels that tying product import quotas to the volume of sales would be comparable to the method whereby crude oil import quotas are tied to refinery runs.

How would Gulf fare under such a change? It would get a residual fuel oil quota of 35,000 bbl. daily instead of the 2,504 bbl. daily quota it has been assigned for the first 6 months of this year.

Other cases . . . Other pleas the board will hear in the weeks ahead will include these:

. . . Standard Oil Co. (Ind.) wants its crude-oil quota increased from 35,120 bbl. daily to 36,379 bbl. daily.

The reason: Refinery strikes at its refineries at Texas City; El Dorado, Ark.; Sugar Creek, Mo.; Whiting, Ind., and Wood River, Ill., cut down its throughput. Indiana Standard feels it should get some consideration because of this.

(Indiana Standard also implies that it may take action later on the "discriminatory" sliding scale applied to crude-oil quotas, and to other aspects of the mandatory import program. It says that it will take such action "before the appropriate tribunal at a later date.")

. . . Cities Service Co. also feels that it has grounds for special consideration.

During a rebuilding program after World War II, Cities Service contracted with Gulf to process 21,000 bbl. daily of Middle East crude for Cities Service.

Who's involved in the import appeals

FIFTY appeals petitions have been filed with the Oil Import Appeals Board. About 30 to 35 hearings will be held.

The members of the three-man appeals board are: Carl F. Oechsle, assistant secretary of commerce; Philip LeBoutillier, deputy assistant secretary of defense; and Royce A. Hardy, assistant secretary of interior. Hardy is the board chairman.

Patchogue Oil Terminal Corp. and Gulf Oil Corp. appeals were heard last week.

Other February hearings will be: Industrial Solvents Corp., February 9; Standard Oil Co. (Ind.), February 10; Cities Service (two petitions), February 12; Metropolitan Petroleum Corp., February 15; and Sinclair Oil Corp. (two petitions), February 29.

Dates for the remainder of the hearings have not been set.

Furthermore, during the appeals for voluntary reductions of imports, Cities Service says it complied while some other firms did not. As a result, Cities Service says it has been put in an unfair competitive position.

What it wants, among other things, is for the 21,000 bbl. daily capacity used for it by Gulf to be considered as Cities Service's refining capacity. This would give Cities Service a larger crude import quota.

. . . Tidewater Oil Co., claiming it is being penalized for progress, presents this case:

In 1957, it was selling 20,000 bbl. daily of residual fuel oil. However, in that year it built its new plant at Delaware City and this new refinery was so designed that it would eliminate almost completely the manufacture of residual.

Tidewater planned to keep its residual markets, however, by importing the product. But because Tidewater was not a residual importer in 1957, it got no residual import quota. Now it is faced with the problem of supplying its residual market even though it has a refinery that produces no residual and it has no import quota.

Tidewater says it can not buy domestic residual at a competitive price to supply its domestic markets and that unless it gets a quota so that it can import cheaper foreign residual fuel, it will have to abandon its residual market.

That, it claims, is the penalty it would have to pay for building a modern refinery.

. . . Metropolitan Petroleum Corp. of New York also has a knotty problem.

Metropolitan's sole business is the distribution of fuel oil at wholesale. It doesn't make or market other products.

It has a skimming plant in which it processes an imported heavy gravity crude (bachaquero). From this crude, it gets 98% residual fuel.

It claims that it can't find a similar grade crude in the U. S., and that to use a lighter grade crude would mean that it would wind up with products other than residual fuel. Since it doesn't want other products, it doesn't want to do this.

But, subject to the crude import formula, Metropolitan has had its import quota cut back. To make matters worse, it has been by-passing the skimming plant with 2,248 bbl. daily of the crude which it is able to convert to residual fuel simply by running it through a mechanical blender.

Yet, Metropolitan points out, the Oil Import Administration does not count that 2,248 bbl. daily as a part of refinery throughput, thus lowering Metropolitan's crude quota. At the same time, OIA does not consider that 2,248 bbl. as residual fuel.

Metropolitan figures that the oil should either be considered as crude or residual—and not ignored entirely. If it is considered as residual, Metropolitan figures it should be entitled to a residual fuel import quota.

. . . Socony Mobil Oil Co. is one of several firms which feels that since it had to make room for newcomers in the crude oil import picture, room should be made for it in product imports. This is particularly important to the company since it is building a refinery in Venezuela.

The new refinery output will include 26,000 bbl. daily of residual. Socony had planned to ship this to the U. S. East Coast, since it has no other outlet for it. But since it now has a quota of only 315 bbl. daily, it is in a bind.

Socony also feels that it has been "punished" for cooperating in the voluntary import control plan. It claims that in 1953, the last full year before voluntary restrictions were applied, it imported 87,000 bbl. daily of crude into Districts 1-4. It cut back, however, under the voluntary plan. As a result, it has a current allocation of 43,300 bbl. daily—a reduction of 43,700 bbl. daily from its 1953 level. That is a cut of more than 50%.

Meanwhile, Socony claims, total im-

ports into Districts 1-4 rose from 570,000 bbl. daily in 1953 to 718,000 in 1960. And 10 other major importers have quotas now that are only 19% less than they were importing in 1953. Socony points out that if that 19% cut were applied to its 1953 figures, it would now have a quota 70,500 bbl. daily. And that's what it is applying for.

... **Phillips Petroleum Co.** presents this "hardship" case: In Venezuela, Phillips is required to refine 15% of its crude production. However, with a surplus of refining capacity in that country, there is no local outlet for Phillips' products.

Phillips has no organization outside the U. S. to market those products, either. As Phillips sees it, its only hope is to get a products quota that will enable it to bring those products to the U. S. Therefore, it is asking for a quota equal to 15% of its Venezuelan crude production.

Those, then, are some of the headaches the Oil Import Appeals Board is facing.

Crude Line Sought

... by new firm from North Dakota into Manitoba.

NORTH DAKOTA may be on the verge of getting its second crude pipeline.

The line is proposed by newly incorporated Matador Pipe Line Corp., which has an application for the pipeline pending before the Canadian Parliament.

If no hitch develops, the 175-mile line will be started early this spring and finished by early summer.

It would carry crude from North Dakota's northern counties — Burke, Bottineau, and Renville—to Cromer, Man., Canada, where it would tie in with the Interprovincial pipeline.

From Cromer the oil would flow to refineries in the Twin Cities which are presently served by truck and rail.

Cost of the project would be more than $4 million, said Cortlandt S. Dietler, Denver, president of Matador and also of Western Crude Marketers, Inc.

Representatives of Western Crude Marketers have been conducting feasibility studies in North Dakota since last fall.

Dietler is cautious in predicting the future of the proposed line. "I'm not making any guarantees until we get all the loose ends together," he said.

Much remains to be answered, he added, such as size and location of gatherings systems and capacity of the main line—which probably would be a 10-in. line.

California's Need of Gas

... outlined during hearings of Canada's National Energy Board. Quick approval would mean Canadian gas would be flowing to San Francisco area by the winter of 1961.

THE SPOTLIGHT at Canada's National Energy Board hearings in Ottawa has shifted to the growing demand for natural gas in California.

One of the big export applications being considered by the board has been submitted by Alberta & Southern Gas Co., Ltd., a subsidiary of Pacific Gas & Electric Co., the big utility which serves the San Francisco area. PG&E wants to export almost 4 trillion cubic feet of gas over the next 25 years.

In other developments at Ottawa:

... **Westcoast Transmission** finished its testimony. The company said if it fails in its bid to export gas through a line it proposes to build with Alberta & Southern, it will make another application without Alberta & Southern's participation.

... **Northern Ontario** Natural Gas Co., which has been bucking Trans-Canada Pipe Lines' export application, abruptly withdrew its opposition. Northern Ontario says it is withdrawing its opposition since it has signed a deal to buy more gas from Trans-Canada.

... **The city of Edmonton** is trying to make amends for the confusion it created earlier by raising a legal question in the midst of the energy board hearings. The city has questioned whether the provincial or federal government has authority over the wellhead price of gas. The city still raises the question, but says it doesn't want to hold up the export hearings and that the city does favor gas exports.

PG&E testimony . . . Canadian gas is being counted on heavily to fill the ever-growing demand for gas in California, according to what PG&E spokesmen told the board.

Herbert H. Blasdale, a supervising engineer for PG&E, said that even with Canadian gas his company will just be able to meet the market demand expected by 1965.

PG&E estimates that by 1965-66, assuming it is unable to obtain more gas, it will be short of its market demands by 615 million cubic feet daily. This is roughly equal to the volume of gas used in all of Canada today.

James S. Moulton, a vice president of both PG&E and Alberta & Southern, said Canadian gas sold in California under the present export proposal would almost triple in price over the 1,400-mile haul. But he said there is no question the project would be economically feasible.

Moulton said the company plans to buy gas in Alberta at a wellhead price of 14.75 cents per M.c.f. It would be laid down at Antioch on San Francisco Bay at an average price of 43.89 cents per M.c.f. during the first year of operation.

Canadian gas would account for 22% of PG&E's sale by 1962, Moulton estimated.

Moulton said his company can finish its proposed system by November 1961 if construction gets under way this spring. PG&E proposes a 36-in. trunkline which will move gas from northern Alberta to California.

Here's the PG&E plan: Alberta Natural Gas Co., owned by PG&E and Westcoast Transmission Co., Ltd., would lay a 107-mile line from the Alberta-British Columbia border to the U. S.-Canadian border near Kingsgate, B. C. (This line would tie into the Foothills section of Alberta Gas Trunk Line, which is scheduled to be built this year).

At the U. S.-Canadian border, another PG&E subsidiary, Pacific Gas Transmission Co., would lay a 614-mile line to Oregon-California border near Klamath Falls, Ore.

From Klamath Falls, PG&E would lay the remaining 296 miles of 36-in. line to San Francisco.

Trans-Canada . . . Trans-Canada's testimony was closed out by James W. Kerr, president of the big line, who declared Trans-Canada will not live or die on the results of export sales.

"We do not say the survival of Trans-Canada is dependent on export sales. We do believe these export sales will contribute very materially to the operating efficiency and success of our system," Kerr said.

Trans-Canada wants to export 408 million cubic feet of gas daily at two different points. It proposed to sell 204 million cubic feet of gas to Midwestern Gas Transmission Co. near Emerson, Manitoba, and the same amount to Tennessee Gas Transmission Co. near Niagara Falls. The latter request involves surplus gas which would be sold on an interruptible basis.

Texas' Cotton Valley Production Moves West

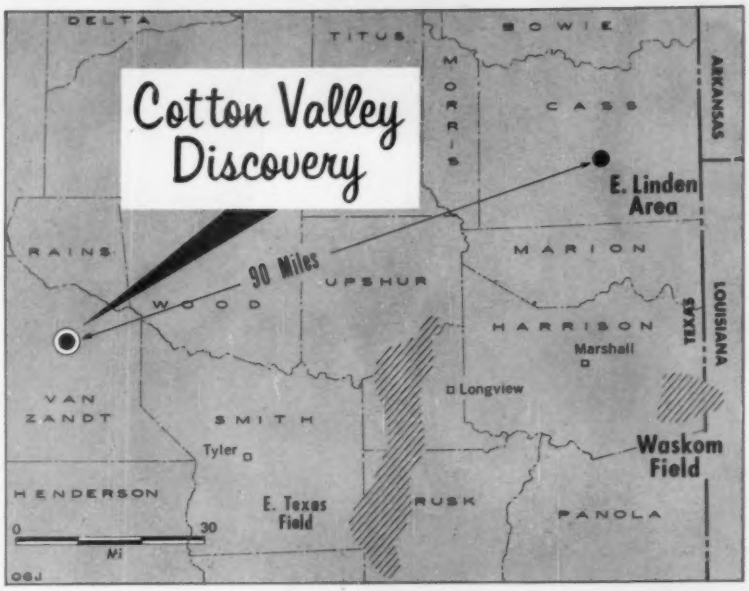
PRODUCTION from northeastern Texas' elusive Cotton Valley formation is being extended 90 miles westward by a deep wildcat discovery in Van Zandt County.

The discovery opens the state's third field to produce from this Jurassic horizon. Nearest other Cotton Valley production is in the East Linden area, in Cass County, near the Louisiana-Arkansas border.

The discovery well, a joint venture by R. J. Caraway and Pan American Petroleum Corp., also is productive from two other zones in the shallower Rodessa (Upper Cretaceous) formation, and is a triple completion.

Production from the deep Cotton Valley horizon, perforated at 10,522-32 ft., is gas, flowing 2,700 M.c.f. daily. Production from the two Rodessa zones is oil. Flow from the lower Rodessa pay, perforated at 8,286-93 ft., gaged 216 bbl. in 13 hours through 13/64-in. choke. The upper pay, perforated at 8,184-94 ft., tested 114 bbl. in 24 hours, flowing through 18/64-in. choke.

The new field is the second in the state with gas production from the Cotton Valley. The other is Waskom, in Harrison County on the Louisiana border west of Shreveport. The state's only Cotton Valley oil production so far is the East Linden area, opened last year by Pan American.



Location of the new Caraway-Pan American discovery well, 1 McCoy, in the J. Cheshire Survey, is just south of Fruitvale. It is 5 miles northeast of Fruitvale field, where gas-condensate production was discovered last year from the deeper Jurassic-Smackover formation.

PROCESSING BRIEFS . . .

Delhi-Taylor will begin distribution this month of toluene, xylene, mineral spirits, and high grade solvents from its new 2-million-gallon petrochemical marketing terminal at Charleston, S. C. The products will be shipped to the terminal by tanker from the company's Corpus Christi, Tex., plant.

A $3-million delayed coking unit has been put into operation at the Corpus Christi refinery of Suntide Refining, subsidiary of Sunray Mid-Continent. The coking unit, completely equipped with an electronic system, has a capacity of 7,000 bbl. daily. It will produce a high quality petroleum coke, propane-propylene, butane-butylene, gasoline, and gas-oil.

Jefferson Chemical Co. has purchased the old Warren Petroleum chemical plant at Conroe, Tex., from Gulf Oil. The plant will be put on stream in mid-1960 for intermediate scale production of new products coming from Jefferson's research lab.

Oakite Products has introduced a solvent-alkali emulsion cleaner designed to remove compounded carbon and asphalt soils from processing equipment. It is called Oakite Composition No. 79.

Cosden Petroleum will triple its styrene capacity at Big Spring, Tex., to 60 million pounds per year. The project will include an Alkar unit to produce ethylbenzene to feed the additional styrene facilities. Design, engineering, and construction will be handled by Badger Manufacturing. Completion is scheduled for late 1960.

Cosden also plans to increase its ortho-xylene capacity to 70 million pounds annually. Plans call for completion of facilities in early 1961.

Ford's entry into the compact car race—the Comet—will go on sale March 17. A selling point being stressed by Ford is the Comet's economy engine—a six-cylinder, 90-hp. engine with an 8.7:1 compression ratio and a displacement of 144.3 cu. in.

Butyl-rubber capacity at Esso Standard's Baton Rouge, refinery will be increased 38,000 long tons annually. Present capacity at Baton Rouge and Baytown is now 97,500 long tons per year.

Also for Refiners . . .

IN THE NEWS: Texas Natural Gasoline, one of the nation's bigger natural-gasoline firms, is merging with Union Oil & Gas Corp. of Louisiana (p. 59) . . . Several big refiners are seeking higher import quotas in hearing before Appeals Board (p. 66) . . . ISA meeting hears that computers are being adapted to oil operations faster than the data available to feed into them (p. 73) . . . A big export deal being negotiated will pave the way for modernizing the big refinery at Haifa, Israel (p. 77).

PLUS THESE TECHNICAL REPORTS: Process-automation instruments now dependable (p. 86) . . . Processing feed stocks for cat cracking (p. 89) . . . An easy approach to centrifugal-compressor selection (p. 107) . . . Electronic instrumentation finds favor at Anchor's Tabasco plant (p. 115).

COLD MORNING provided this view of coating and wrapping operations of H. C. Price Co. in Mountain Valley, near Kingman, Ariz.

PREHEATING of pipe before welding was required by the cold weather. This scene is on an R. H. Fulton & Co. spread near Grants, N. M.

Pipeliners Fight

• Paul Reed, Journal pipeline editor, is just back from a visit to all spreads on Transwestern. Here's his report:

UNDER Alpine and Arctic conditions, contractors are pushing ahead with construction of Transwestern Pipe Line Co.'s big-inch gas line to California.

It has been a winter of unusually heavy snowfall, so far, along the 670-mile route of the 30-in. trunk line from the California border across Arizona to southeastern New Mexico.

By February 1, five spreads had welded 288 miles of this part of the project.

In addition, 185 miles of 490 miles of 24-in. and 20-in. laterals had been welded in Texas and New Mexico. And 153 miles have been welded of the 600 miles of 16-in. to 4-in. laterals in the Texas Panhandle, Northwest Oklahoma, Southwest Texas, and Southeast New Mexico.

SNOW SCENE along the Transwestern right-of-way. An H. C. Price pipe gang is lining up pipe near Ganado, Ariz.

Snow, Cold Weather to Lay Big Gas Line

All of this amounts to 628 miles of line welded for the whole 1,750-mile project. Construction started in October and November. Completion date is set at July 1.

Along the main line, snow and frozen and wet ground conditions were severe enough to shut down some spreads in mountainous areas of Arizona and New Mexico. But some spreads managed to go steadily along.

Temperatures running sometimes near zero in the mornings at high elevations along the route often require special provisions for preheating of the pipe before running the stringer bead and for defrosting ahead of cleaning and priming operations.

New developments have appeared on the line in welding equipment and in the organization of welding operations.

Advances in automatic welding for double jointing have resulted in bringing a preponderance of long joints to the project of 80-ft. and 60-ft. lengths in addition to the conventional 40-ft. joints.

Extensive areas of rock in some areas require large-scale provision for padding rocky ditch to protect the coating of the pipe. An article discussing details of Transwestern construction will appear in a later issue.

VISITING OPERATIONS are R. C. Shival, general superintendent for H. C. Price Co.; N. C. Turner, Transwestern vice president; and N. F. Blundell, Gulf Interstate Co. chief engineer. For a story about Turner, who is in charge of engineering and operations for Transwestern, see page 179.

Phillips' first team

Feist Slater Broaddus Adams Allen

Beall Wing Heine

. . . Five are left

Adams

Beall

Heine

Slater

Feist

Basketball Pays Off for Phillips

• Phillips 66 is best known in the sports world as a perennial basketball champion—but the program also develops men for the company.

PHILLIPS Petroleum Co. has been fielding basketball teams for 39 years.

The teams have gained a reputation for producing All-American players—but their less-publicized long suit has been turning out top-notch employes and executives for the Bartlesville, Okla.-based firm.

For instance, five of the seven players on that first Phillips 66 squad of the 1920-21 season still are with the company. Here's the roster:

K. S. (Boots) Adams, chairman of the board and chief executive officer.

K. E. Beall, vice president and petroleum consultant.

Melvin Heine, manager, purchasing department.

K. G. (Slick) Slater, chief accountant, comptrollers department.

William E. (Bill) Feist, employe-relations department.

One of the players on that original team, Horace C. Allen, has retired and is living in Rockford, Ill. Another player, V. T. Broaddus, and the coach, O. K. Wing, are dead.

More proof that the basketball program pays off in manpower dividends: 93 of the 142 men who have worn Phillips 66 jerseys since that first season are still with Phillips.

Here's just a few: Paul Endacott, president; Bill Martin, secretary and assistant treasurer; Hayward Marsh, assistant manager of the tax, insurance, and claims department; R. C. Pitts, assistant general traffic manager; and Louis G. Wilke, sales department, who serves on President Eisenhower's advisory council on youth fitness and is a member of the U. S. Olympic basketball committee for the 1960 Olympic games.

Many of the former players are engaged in sales work for Phillips. However, there are "graduates" of the Phillips teams who are now credit managers, production superintendents, geologists, land men, traffic coordinators, researchers, tax experts, engineers, and personnel and industrial-relations people with the company.

How it started . . . Phillips was only 3 years old when that first basketball team was organized.

Adams, a speedy Kansas University forward before joining Phillips, was a warehouse worker in Bartlesville in 1920. He interested six other employes in doing some practice basket shooting after hours.

The group began scheduling games in the 1920-21 season, playing and practicing on the YMCA court on their own time. The Phillips team played 24 games that first season—racking up an impressive record of 22 victories against only 2 defeats.

The Phillips roundballers have been carrying off trophies ever since. Their

all-time record: 1,213 games won, 190 lost.

Nine Phillips teams have been AAU champs. Phillips players have been selected on All-American teams in all but 2 years since 1937. The 1948 and 1956 squads were Olympic champions.

Present Phillips players—just like those through the years—do their practicing after a full day at the office. About 55 games are scheduled each season. The team members miss work while on road trips, but they put in their regular hours during the home stands.

Athletic ability may give a man a foot-in-the-door approach to a job with Phillips, but whether he stays on the team and with the company depends chiefly upon his contribution as a company employe.

In addition to the obvious benefits of attracting first-rate manpower, Phillips views its basketball team as a dandy sales and merchandising program and a bulwark in the company's overall public-relations effort.

Thousands view the Phillips 66 team each season performing on basketball courts throughout the nation. The feats of the Phillips 66 players reach millions more through the sports pages and magazines.

Instrumentation Still Growing

TECHNOLOGY in building computers has outstripped the ability of the operators to make full use of them, but the rapid growth of instrumentation for the oil industry will not slow down in the years ahead.

Computer experts described in Houston last week several significant developments in their field. Among them:

... **Computers** are more advanced than the material fed them. Operators must be able to describe the process in better mathematical form.

... **Single-purpose** computers will be used more and more in the next 2 to 3 years. These computers will be designed to control only one process.

... **The entire field** of automation offers the country a realistic means of maintaining its rapid growth rate.

These conclusions were reached at the Winter Instrument-Automation Conference of the Instrument Society of America.

Thomas C. Wherry, manager of instrumentation and automation for Phillips Petroleum Co. at Bartlesville, said that description of processes in mathematical form is lagging computer development.

Wherry suggested two ways for getting more data for the computers—using analog computers for system studies and forming system engineering teams. Such teams can design the instrumentation at the same time they design the plant. Using the system design technique, the teams could also choose carefully the components that will lower costs of raw materials, capital equipment, and operations.

Chalmer E. Jones, vice-president of Daystrom's Control Systems Division at La Jolla, Calif., told the conference that small, single-purpose computers will increase in use in the next few years.

Since the swing to solid state circuitry, computer systems have developed a reliability which should give a life span equal to that of the process equipment.

After this, Jones expects improvements in analytical instruments and transducers.

Charles D. Stewart, deputy secretary for research and development for the U. S. Department of Labor, said that computers are a realistic means to maintain this country's rapid growth rate.

INDUSTRY BRIEFS . . .

The Oklahoma Corporation Commission last week boosted the Oklahoma per well allowable for February to 22 bbl. daily. This will produce about 555,000 bbl. during the month. The basic allowable has not been above 20 bbl. since May 1957. It had been 20 bbl. for November, December and January.

Holdings of W. A. (Gus) Delaney, Jr., Ada, Okla., independent, in Oklahoma, Arkansas, Texas, and Wyoming have been purchased by Ibex Co. of Graham, Tex., and Graridge Corp. of Breckenridge, Tex. Bruce Street and M. Boyd Street of Graham are partners in Ibex and both are vice presidents of the Graridge Corp. Lester Clark is Graridge president. The holdings reportedly involve about 90,000 acres of undeveloped leases and 225 wells on about 100 leases. Delaney is retaining his Louisiana holdings.

An allowable of 85,000 bbl. daily for the current quarter have been set by the Arkansas Oil and Gas Commission, which also approved a 200-bbl.-daily increase for Midway field, Columbia County. Edward Albares, chief engineer for the Louisiana conservation department the last 6 years, has been named Arkansas commission director.

Hughes Tool Co., Houston, has authorized Herramientas de Acero, S. A. de CWMV., Mexico City, to produce Hughes rotary rock bits and tool joints. The Mexican firm is building a manufacturing plant at Vera Cruz. Hughes will manufacture cones and bearings in Houston and supply them to Herramientas to install on bit heads made in Mexico.

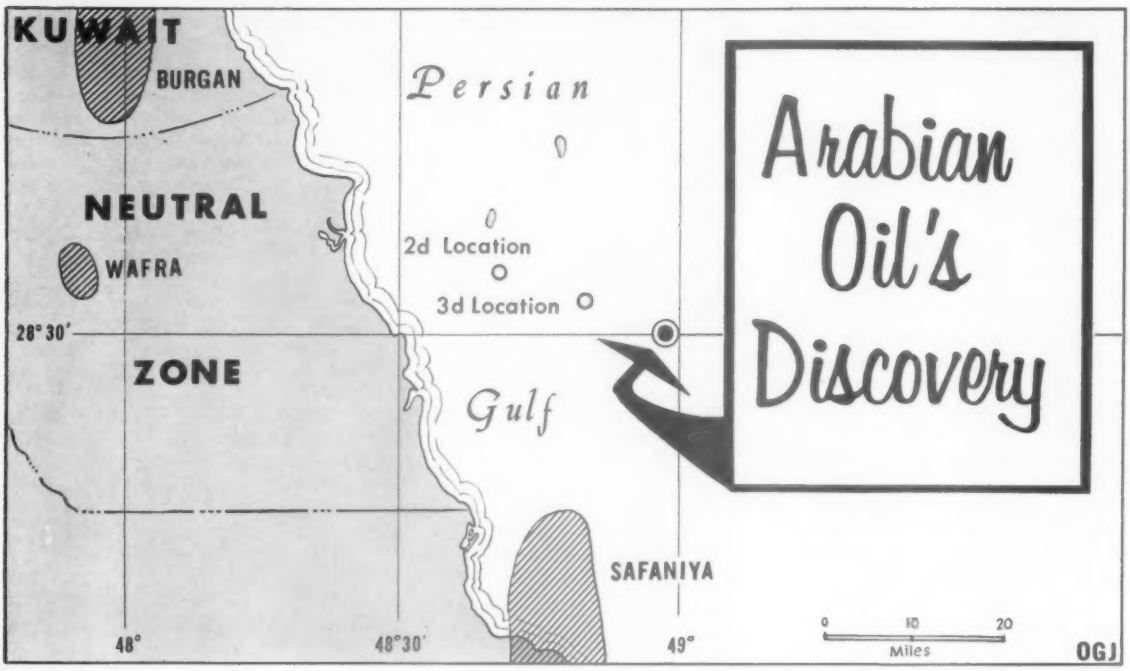
Tidewater Oil Co. is starting work on a 100,000-bbl. bulk marine terminal in South Norfolk, Va., at a cost of $500,000. The site is 60 acres at Money Point on the southern branch of Elizabeth River, and leaves room for expansion to 1 million barrels.

Sale of oil and gas drilling reservations in 12 parcels has added more than $931,000 to the Alberta treasury. The highest price paid was $252,517 (or $35.07 per acre) for a 7,200-acre parcel north of Pembina field by Texaco Exploration Co. and Texaco of Canada.

Assets of Utah Southern Oil Co., Denver, have been purchased by Texas National Petroleum Co., Houston. The 39-year-old Denver firm, which will be liquidated, has 3,200 net barrels daily of production, 73.53 net wells, 12,106 net acres in production, and 153,858 acres of undeveloped leaseholdings in Utah, Wyoming, and Colorado. Proved reserves are estimated at 15,741,802 bbl. of oil and 10.6 billion cubic feet of gas.

The Lion Oil Division of Monsanto Chemical Co. will move its headquarters from El Dorado, Ark., to St. Louis, home of the parent company. The move will be made in mid-1961. About 300 employes will be involved in the move.

Eight oil wells in West Newport Beach field have been purchased by Producing Properties, Inc., Beverly Hills, Calif., from Federal Oil Co. This adds about 450,000 bbl. to the company's reserves, the company reported.



Persian Gulf Strike Gives Jap Firm New Life

• Japanese Government promises Arabian Oil $42 million in immediate support and more may be coming. This will give the company enough to start developing its new-found oil off the Neutral Zone.

NOTHING succeeds quite like success.

For more than 2 years now the Japanese-owned Arabian Oil Co. has struggled almost in vain to round up the financing it needed to acquire a respectable piece of the Middle East's oil. About 50 industrial firms in Japan agreed to back the venture when the company was organized and before it had persuaded both Saudi Arabia and Kuwait to grant it a concession offshore in the Neutral Zone.

Then, with concession agreements signed with both Arabian rulers, the Japanese backers began to disappear. Some blamed a tight money market in Japan. Others just lost their enthusiasm for the whole project. Some thought Arabian Oil had been too liberal in the deal with the Arabs.

Last July, literally operating on a shoe string, the Japanese company spudded in its first wildcat on the untested, but highly regarded, Persian Gulf area. At that time it had a paid-up capital of only $9.5 million with a budget for 1959 alone that called for spending $12.5 million. A costly blowout and fire 2 weeks after the well was spudded only added to the problem.

Last week it was pretty obvious that the worst of the company's problems were over. Just 2 days after the Japanese firm revealed proudly in Tokyo that it had found commercial oil in the first well, the Japanese Government promised the company "positive aid"—about $42 million before the end of the year.

Eisaku Sate, Japan's finance minister, sprang the news of the immediate financing. Hayato Ikeda, international trade and industry minister, added that he favored a loan of another $175 million which he said the company needs to drill 43 more wells by 1964.

The well . . . The thing which sparked these generous financing offers in oil importing Japan is what appears to be a fairly respectable oil well even by Middle East standards.

Few details were available last week but the company said the well tested at the rate of 6,290 bbl. daily.

Taro Yamashita, who heads the company, said in Tokyo the pay was found at 4,920 ft. All reports indicate several productive zones were found.

International Drilling Co., contractor on the well, landed a string of 7-in. casing at 5,505 ft. before the tests were run.

All this would indicate that the Japanese have found production in a Cretaceous sandstone similar to or the same as that found at Arabian American Oil Co.'s Safaniya field to the south-southwest about 25 miles. Safaniya produces about 60,000 bbl. daily of 27°—gravity crude from 17 wells. Another 15 wells are shut in.

The Japanese spotted the first location in 102 ft. of water after some of the most intensive seismic work ever done in the Middle East. The location surprised most observers who expected the newly organized firm to move just as close to the Aramco's Safaniya field as possible.

It was originally slated as an 8,000

ft. test with the Jurassic Arab zone as the objective.

The well blew out July 19 after hitting a high-pressure gas zone at about 1,500 ft. and burned for 9 days, destroying the rig and much of the drilling equipment. Drilling resumed with new equipment 4 months later in the original hole.

Impatient over the delay caused by the blowout, the company late last year increased its capitalization to $28 million and contracted for a second drilling contractor and platform to accelerate its program.

More Maracaibo Oil

. . . gets outlet as Shell completes line from lake.

CIA. SHELL de Venezuela has completed one Lake Maracaibo project, and will soon start another.

The company has opened its Lake Block E (Blocks 7 and 8) to commercial production for the first time, after laying a 16-in. line from the northeast corner of the block to a gathering station in Block C. The crude then moves to shore at Bachaquero.

The high-priority project was started when Phillips Petroleum and its partners started drilling wells in Block 17 to the west, and Block 10 to the east of Shell's acreage. Shell considered the wells too close to its lines for comfort, and started drilling offsets.

An 8-in. flow line has been laid from the southwest corner of the block diagonally across to the northeast corner, where it ties into the 16-in. line.

Shell's new project will be a $700,000 modernization program at the Colon terminal. A 12-in. loading line will be laid to two new berths that will load tankers of up to 32,000 tons in 35 ft. of water. Depth of the old installation is 15 ft.

Imports to Britain Increase

BRITISH imports of crude and products rose above 1 million barrels daily last year.

Deliveries to the United Kingdom averaged 1,057,000 bbl. daily, a rise of 17.4% over the preceding year. Total cost of the oil was more than $1.3 billion. Crude imports accounted for 800,000 bbl. daily, and products the balance.

Total imports were much higher than domestic consumption because of exports and re-exports of products worth more than $280 million. Another 75,000 bbl. daily was accounted for by bunkers for ships in foreign trade.

Faster Bunkering Prepared at Aden

TWO NEW bunkering buoys are being installed at Aden Harbor to service fast new p'assenger liners being built especially for the United Kingdom-Australia run.

The big ships will reduce the voyage by a week, and to shave off more time on the high speed run, a faster refueling system is being installed at the mid-way bunkering stop.

Two 2,800 ft. 16-in. submarine lines have been laid from the British Petroleum Co. bunkering terminal at Steamer Point. New pumps will be able to deliver more than 10,000 bbl. of fuel oil per hour to visiting vessels. Aden, located on the southern tip of the Arabian peninsula, is one of the biggest bunkering terminals in the world.

Jersey Closes Deal in Ecuador

• Purchase of an interest in Anglo-Ecuadorian puts Jersey in Ecuador's producing-refining picture for first time.

ESSO STANDARD (Inter-America), which is buying International Petroleum Co. from Jersey Standard and a small percentage of minority stockholders, is moving into another Latin American country.

The affiliate, virtually unknown until it started taking over one of the biggest Jersey companies from the parent organization, has taken a minority interest in the biggest operator in Ecuador.

Esso Inter-America has acquired 19% interest in Anglo-Ecuadorian Oilfields, which produces most of the country's 7,800 bbl. daily of crude, owns a 7,700-bbl. refinery at La Libertad, and is a major marketer.

The interests were obtained by taking over shares held by South American Gold & Platinum Co. Esso will name two men to an eight-man board. The largest shareholder in Anglo-Ecuadorian is Lobitos Oilfields, with 35%. The remaining interest is held publicly.

Esso has no plans at present for an investment program in Anglo-Ecuadorian. Esso now markets lubricating oils and aviation gasoline in Ecuador, but it has no plans at present to enter the market for other products under its own brand name.

Jersey Standard already works closely with Lobitos in Peru, where International Petroleum has half interest in the company's operating subsidiary.

New Arabian Peninsula Drilling Likely

● IPC nears agreement with two states for drilling in an area in Aden Protectorate. But Saudi Arabia still could throw a hitch in the deal.

A NEW agreement in the final stages of negotiation will pave the way for drilling in another part of the Arabian Peninsula—if a rhubarb with Saudi Arabia over drilling rights doesn't interfere.

The region is Aden Protectorate, an inhospitable territory stretching more than 600 miles along the southwestern coast of Arabia.

Petroleum Concessions, Ltd., an affiliate of Iraq Petroleum Co., has held a concession covering the protectorate for more than 20 years through the British Government, which handles the foreign relations of individual governments within the protectorate.

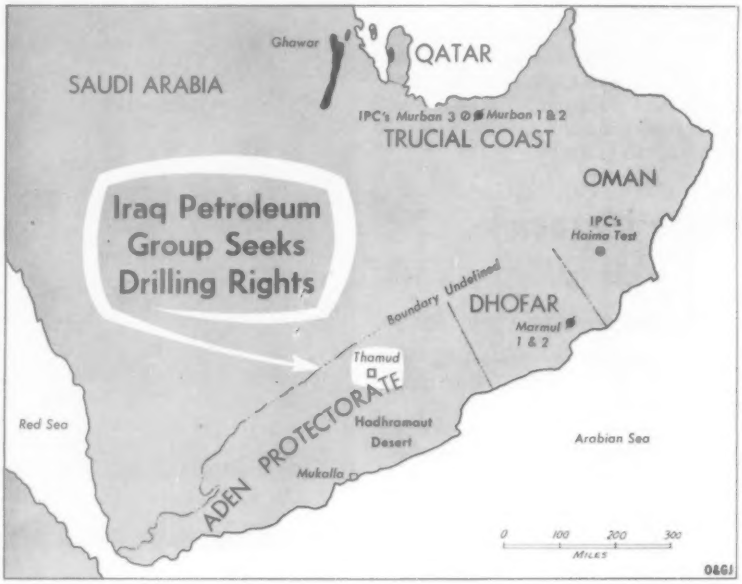
But the concession has meant little, except for the right to carry on surface work, because the company hasn't come to terms with the local governments who will receive income from any oil production. IPC is now seeking drilling rights in two sheikdoms covering an area surrounding the town of Thamud.

There are 25 of these independent or semi-independent governments, many of them tribal organizations. Until now, British promptings for a general agreement for pooling of oil revenues for the mutual benefit of all have not reached first base. Local jealousies are too strong, and some leaders have visions of an oil jackpot under the particular lands they claim.

Talks now in progress include only two of the governments, the sultanates of Quaiti and Kathiri. The two states, however, both claim the area that looks most promising to IPC geologists. This is the northern Hadhramaut desert, in the vicinity of Thamud.

After months of talks, Quaiti and Kathiri have agreed to divide any of their oil profits 2 to 1 as the major provision of a new pact. The unbalanced split was evolved because Quaiti has five times the population of Kathiri.

Negotiations now being carried on jointly by the two governments with Petroleum Concessions are undoubtedly tough. The sultanates have employed as their adviser Samir Shamma, a Palestinian who was legal consultant to the Saudi Arabian Directorate of Petroleum and Mineral Affairs from 1954 through 1959. He played a leading role in drafting the concession awarded by Saudi Arabia to the Japanese-owned Arabian Oil Co. over undivided half interest in offshore waters of the Neutral Zone. This will give Saudi Arabia the big half of a 56-44 profit split.



The leading newspaper at Mukalla, where the talks are in progress, also is cautioning that the company should be made a contractual agency, producing and selling the oil on behalf of the states.

Saudi Arabia . . . A final agreement with Quaiti and Kathiri will not necessarily mean clear sailing for a drilling program. The Thamud area is in the extreme northern part of the territory disputed by the local governments. This same region is also claimed by Saudi Arabia.

The dispute between the Saudis and the protectorate broke into open hostilities 5 years ago, with oil crews right in the middle. Two Aramco survey parties, escorted by Saudi troops, crossed the line into territory where the British said they would tolerate no outsiders.

The parties were located by air, and Bedouin troops moved up quickly to intercept them. The crews were advised to leave immediately. They left behind valuable gear which still stands rusting in the desert.

Edjele to Produce 160,000 Bbl. Daily

THE FLOW of French oil from producing fields in the Sahara will be increased 160,000 bbl. daily next year when light crude starts moving from the Edjele area.

Completion of the 420-mile 24-in. line to open three shallow producing fields in the Edjele area is now slated for October. The line links the producing area and a new terminal at La Skhirra on Tunisia's Gulf of Gabes.

The output estimate for Edjele in 1961 was made last week by Paul Moch, chairman of Sogerap, French oil investment group which holds a major interest in Cie. de Recherches et d'Exploitation de Petrole au Sahar (Creps), the producing company. Royal Dutch-Shell owns a 35% interest in Creps and the remainder is spread among French investment companies and the government.

Moch, who is active in French oil financial circles, predicted that the productive potential of the Edjele region will be great enough by 1961 that a second pump station will have to be added to the line.

The Sahara's first big-inch crude line, from Hassi Messaoud to Bougie, went into operation early last December. The two producing companies developing the big field moved a daily average of more than 92,000 bbl. through the line the last month of 1959.

French Balk at Expanding Common Market

• Dutch suggest West Indies might come under tariff-free arrangement, but French delay action on the proposal.

THE FRENCH last week were offered a taste of the same medicine they have been trying to peddle Europe's Common Market, and it was not too palatable.

France balked at a Dutch request to start talks aimed at bringing the Netherlands West Indies under the group's tariff-free umbrella. French representatives at the Brussels meeting of the ministerial council insisted that the whole discussion be postponed until the next meeting. They pointed out that French Foreign Minister Maurice Couve de Murville was absent.

The newly oil-minded French have been trying for weeks, not very successfully, to get their Common Market partners to agree to a tariff scheme which would give preference to Algerian oil. Last week they apparently viewed the Dutch request as a move to get the same kind of preference for products refined at the big Dutch West Indies refineries.

One point which the French apparently overlooked is that the Dutch islands in the Caribbean are already halfway in the Common Market. An appendix to the Rome treaty of 1957 which established the six-nation Common Market recognizes the islands as a part of the Dutch Kingdom. All the Dutch must do under the terms of this document is request its partners to negotiate trade agreements affecting the West Indies.

It's not very likely that the Dutch will make a serious effort to carve a very large chunk of the European Common Market oil demand for the West Indies refineries. Output from the 680,000 bbl. daily refining capacity at Curacao and Aruba is already pretty well confined to Western Hemisphere markets.

Last year just about 4% of Netherlands West Indies petroleum exports went to the six Common Market countries in Europe. Much less was shipped to all other European markets. The biggest single customer for these exports is the United States, which takes more than 47% of the output. The rest goes to other Latin American markets.

Israeli Refinery Closing Big Export Deal

A NEW company has been organized to handle crude and products exports from Israel.

United Petroleum Export Co. was set up by four local companies, each of which has 25% interest. The companies are Consolidated Refineries, Ltd., owner of the 87,000-bbl. Haifa refinery, and three other firms.

Reports from Tel Aviv say the company is reaching an agreement with a Dutch firm for the sale of 5 million barrels of products. The buyer, in turn, represents other buyers in the Netherlands, Belgium, and Scandinavia.

A firm contract will enable Consolidated Refineries to put through a plant modernization program that will enable an increase in runs to cover the exports. Throughput has been limited to domestic needs ever since the late 1940's. Demand is still less than 30,000 bbl. daily.

Pipeline expanding . . . Plans for exports are being made as the result of an expansion program for the 250-mile pipeline system from Elath to Haifa, which is located on the Mediterranean coast.

French and American financial groups are putting up the money for a new 125-mile 16-in. section from Elath to Beersheba. This will make the system 16-in. all the way, and increase capacity from 30,000 bbl. to 100,000 bbl. daily or more.

The pipeline will be operated by Tri-Continental Pipe Lines, Ltd., of Calgary. Its concession from the Israeli Government guarantees a minimum net profit of 8% for 10 years.

The Haifa refinery was purchased 2 years ago by Paz Oil Co. from Shell and British Petroleum. The new owner of Consolidated Refineries, Ltd., is a leading local marketer.

FOREIGN BRIEFS . . .

British Petroleum will have half interest in a 60,000-bbl. refinery planned at Durban, South Africa, by Royal Dutch-Shell. The companies have organized South African Petroleum Refineries, Pty., to operate the plant, which is scheduled for completion in 1963.

Work will start immediately on a 20-mile natural-gas line from Zohar field to the Dead Sea. Naphtha Israel Oil Co. is selling the gas from its new field to a potash plant at Sodom. Production tests are under way on Zohar 6, the latest well in the small field.

Iraq is expected to invite bids soon for a natural-gas pipeline from Rumaila oil field to Basrah. The line will deliver 10,000 M.c.f. daily to a new power plant in the final stages of construction. The project will include a feeder line designed to carry 4,000 M.c.f. daily to a fertilizer plant to be built in the same area.

Two out of three wildcats completed in Nigeria in December were discoveries. Ibibio 1 was completed at 9,179 ft., and Alakiri 1 was bottomed at 11,490 ft. A dry hole at Umuowa was abandoned at 6,803 ft. Five new wildcats were started in the month.

A styrene-butadiene plant will be built at Rotterdam by Nederlandsche Dow Mij., N.V. Dow did not disclose the capacity of the plant, but it is expected to cost about $2 million. Completion is scheduled early in the spring of 1961.

A new ethylene plant being built for SINCAT, S.p.A., in Priolo, Sicily, is scheduled to begin operation early this spring. It has been designed by Stone & Webster Engineering for SINCAT, owned by the Societa Edison group. The petrochemical unit is part of an integrated chemical manufacturing complex.

United Carbon Co. will form a French subsidiary to build and operate a $5-million carbon-black plant near Rouen in north central France. Completion is scheduled for early 1961. It will have an initial capacity of 50 million pounds a year.

W. C. McGee, Jr., Tennessee Gas Pipeline Co., and D. Michael Curran, Curran & Co.

C. S. LeNoir, C. S. LeNoir Construction Co.; W. B. Williams, of the same company; and Kenneth Owen, Parkhill Truck Co.

WHAT PIPELINERS HEARD AT LOS ANGELES

Pipeline outlook for 1960 is good—

"... if we are able to get fair prices for our work," PLCA president tells convention

JOHN H. WILLIAMS

ANOTHER 10,000-mile-plus year was recorded last year by members of the Pipe Line Contractors Association.

And the outlook for 1960 is for a continued high volume of work for members of the association, which includes the major builders of trunk pipelines.

This picture of the construction trend was presented last week by John H. Williams, president of Williams Brothers Co., Tulsa, and outgoing president of the PLCA, at the twelfth annual convention in Los Angeles. His report and forecast were based on a survey of the construction companies comprising the association.

Only 6 of the 40 pipeline builders failed to respond to the survey, but all the big ones were represented in the figures.

1959 vs. 1958. Construction by PLCA members last year was broken down as follows:

... Natural-gas transmission—6,957 miles.

... Natural-gas gathering—732 miles.

... Natural-gas distribution—1,107 miles.

... Crude trunk lines—547 miles.

... Crude gathering—zero.

... Products lines—864 miles.

... Water lines—56 miles.

The total amounted to 10,263 miles, roughly the same as in 1958 when these contractors reported laying 10,600 miles. These figures do not include all construction in the United States, especially in the gathering and distribution categories. However, they do account for virtually all trunk-line building.

Many local contractors who work only in limited areas and many general contractors who do only occasional pipelining are not members and therefore are not in the PLCA figures.

Members reported a dollar volume of $149 million for 1959. For 1958, dollar volume was much greater, although total mileage was similar.

Williams said that contractors last year did about the same amount of work as in 1958, but for about 37% less money. However, he cautioned that a true comparison could not be made because the method of reporting had been changed.

1960 Prospects. Williams said the outlook was for a "good 1960." His optimism was tempered with this qualification—"if we are able to get fair prices for our work."

A continuation of the keen competition which has held footage prices steady in recent years, or actually caused them to decline in the face of higher costs, can be expected this year.

The survey indicated that PLCA members had available 108 trunk-line construction spreads. This compares

B. E. Barnes and Edwin Hubach, both of Williams Brothers Co.

Richard A. Gump, Pipe Line Contractors Association; R. P. Gregory, Houston Contracting Co.; and F. S. Young, Gulf Interstate Co.

to the 1959 report of 94 spreads actually in use some time during the year.

Contractors look abroad. The competitive domestic situation has prodded many U. S. contractors to go abroad to cash in on the foreign building boom. In looking for greener pastures abroad, domestic contractors have helped to create a similar competitive situation there.

A few years ago the number of pipeline contractors with the know-how, the capital, and the inclination to work outside the U. S. was relatively small. But with the construction of pipelines in Canada, Europe, South America, Africa, and Asia, an increasing number of domestic contractors are becoming familiar figures in such exotic places as Beirut, Baghdad, Teheran, New Delhi, Paris, London, and Buenos Aires.

A large number of contractors at the convention had either just returned from a foreign capital or were preparing to depart to look over a foreign job or sit in on a letting.

They find that they are not only running over each other, but also new foreign contractors who have been lured by the same rise in pipeline construction to open up oil and gas discoveries in remote parts of the world.

As a result contractors are finding foreign work to be about as competitive as that at home, and with much greater attendant risks. But opportunities for profit in this field are still good enough to attract a growing number of American firms.

Marshall Optimistic

Pipeline contractors don't need to worry about their business being hurt by the world-wide excess producing and refining capacity which is troubling the oil industry.

Pipeliners can expect to ride out this period without being affected too much, in the opinion of J. Howard Marshall, executive vice president of Signal Oil & Gas Co., who addressed the PLCA on the future of the oil and gas business.

"There will be a lot of work for you over the next few years despite dreary times for some other branches of the petroleum industry," Marshall said.

Long-term outlook. The last thing that pipeliners should want is a static situation, Marshall commented, one wherein there would be a supply-demand balance with no shift in types of energy and no new sources of supply.

J. HOWARD MARSHALL

And there is certainly no static situation today, as far as the pipeliner is concerned.

"When supply sources are shifting—even when they are shifting from fuel oil to natural gas—this leads to new pipeline construction," he pointed out.

"Since the end of World War II, the natural-gas industry has grown at a rapid rate, tremendously boosting it as a source of primary power. This is bad for us as marketers of fuel oil, but it's good for us as producers of natural gas.

"It's also good for pipeliners—those who promote pipelines and those who win the contracts to build them."

Competitive pressures were cited as another stimulus to pipeline construction. These pressures are ever present in a hotly competitive market such as the U. S. is today. This is particularly true of refined products.

Refiners keep looking for quicker, cheaper ways to get to market. And new products—such as LPG's which formerly were wasted—also need economical transportation; pipelining is frequently the answer.

Gas-line future. Long gas-line construction, which some have been predicting for years would soon taper off if not stop altogether, is going to continue for several years, Marshall believes.

"Long gas-transmission-line building

Felix Johnson, Trojan Construction Co., and Parker Boggs, Colorado Interstate Gas Co.

S. Miller Williams and Austin Manuel, retired contractors and honorary members of PLCA.

has by no means come to an end, Federal Power Commission or no Federal Power Commission."

Marshall likened the oil business to a closed-system pipeline which obeys the laws of hydraulics.

"When the pressure of large new supply sources builds up, something will give. The large Canadian gas discoveries, by means of this law of hydraulics, will come to market, and there is no other way to get the gas there but by pipeline."

A word of warning. Just how big the future of pipelining will be is at least in part in the hands of the contractors themselves.

"I hope you don't price yourselves out of the market, as the steel industry, with the help of the unions, seems bound and determined to do. How much you build will depend in part on how much you will charge for your services."

Industry outlook. Since pipeliners are an integral part of the industry as a whole, Marshall devoted much of his talk to explaining the cycles of the oil business.

He said that one of the failings of oil men is a short memory. To illustrate he quoted the recent remark of a colleague:

"When the oil business is good, none of us can see how it's ever going to get bad again. And when it's bad, we can't imagine how it will ever get good again."

He went back to the 1930's to recall bitter quips to the effect that when an oil company made a major discovery, its stock would likely fall several points. In those days instability was the rule of the industry.

Then proration and a new conservation statute helped to save the industry from chaos.

But these ups and downs were nothing new even then.

"The oil business has since the time of Colonel Drake been characterized by rapid swings from prosperity to adversity. After 1940 we had a tendency to forget it. The war rapidly increased demand and our troubles were over for the time being. We were back to the feast part of the feast-and-famine cycle."

"Now, Marshall said, for the first time since before World War II, the industry faces a lot of difficult competitive problems.

"We find ourselves in a feast situation—a feast in supply that brings financial famine."

At this point he recalled a wry comment to the oft-heard charge that the oil industry has bad public relations:

"We have good public relations—the public has no idea how badly we run this industry."

Foreign oil impact. Marshall again used the simile comparing the oil business to a closed hydraulics system in discussing its delicate economic balance.

"You can't put pressure on any part of the system without an immediate effect on all parts of the system," he said.

"When there is a change or a shift in sources or volumes of basic supply, that change, whether up or down, is felt immediately. Some thought that we could insulate ourselves from supply pressures that have been building up in recent years.

"We can install some check valves to relieve the pressure, and we have in the form of import quotas, but the pressure is still there and threatens to break through. And even if it doesn't break through, the threat itself is enough to exercise pressure.

Foreign pressure just begins. Marshall noted that before World War II, there had never been an intensive search for oil and gas abroad using modern techniques. A few of the "easy" fields had been found, but not even all of the most obvious structures had been drilled.

Now this situation has been altered drastically.

"Some of the greatest fields are yet to be found," Marshall predicted, "and all of this pressure is still building."

He cited the recent Sahara Desert discoveries which have been connected by pipeline to the Mediterranean.

"No matter what check valves we try to install, the effect in markets will be intense," he said. "The pressure will be there constantly."

He referred to the Japanese discovery in the Persian Gulf off Kuwait and added: "There don't seem to be any runts in the litters in the Middle East. This will hit the Japanese market, which has been a good market for Middle East crude, and will be felt in South America, Europe, Canada, and the United States."

Prospects for balance. How long

F. A. Phillips, Ford, Bacon & Davis Construction Corp.

Joe Benson and Gordon Koonce, both of Oklahoma Contracting Co.

M. E. Shiflett, Panama, Inc.

will the oversupply pressure continue?

Marshall's guess is "some years"—barring a war, Suez closure, or Russian capture of the Middle East.

"Some say that an increase in demand always covers up our mistakes," he said, "but we must guess this will take time."

However, he urged pipeline constructors not to be depressed with this outlook because of what he considers to be their insulated position.

Gray elected new PLCA president

Jack S. Gray, president of Grayco Constructors, Inc., Austin, Tex., last week was elected president of the Pipe Line Contractors Association at the annual convention in Los Angeles.

Gray succeeds John H. Williams, Williams Brothers Co.

Robert D. Sheehan, Sheehan Pipe Line Construction Corp., was reelected first vice president; J. W. Sharman, Sharman, Allen, Gay & Taylor, Inc., was elected second vice president, succeeding M. S. Williams, Panama-Williams Corp.; and E. G. Morrison, Western Pipe Line Inc., was elected treasurer, succeeding Felix Johnson, Trojan Construction Co.

The membership named as new directors A. K. Barlow, McVean & Barlow; C. S. LeNoir, C. S. LeNoir Construction Co.; Kenneth A. Owen, Parkhill Truck Co.; Roger L. Pentzien, Pentzien, Inc.; and J. C. Howe, Engineers Limited Pipeline Co. Holdover board members are R. P. Gregory, Houston Contracting Co., a former president; and John H. Williams and M. S. Williams.

Some 700 persons registered for the convention, about the same as last year when the PLCA met at Miami Beach. Next year's convention will be in San Francisco.

JACK S. GRAY

New president. The pipeliners picked a relative newcomer, one with an unusual background, for the top job in their organization.

Jack Gray has been a pipeline contractor only since 1951. He is perhaps better known in collegiate athletic circles than in pipelining, although in the few years he has been a contractor he has fast become a leading figure.

Gray joined the basketball coaching staff of University of Texas upon his graduation there in 1934. He became head coach in 1936. He continued as coach until World War II when he joined the Navy and served as a flight-deck officer aboard an aircraft carrier in the South Pacific during 1942-45.

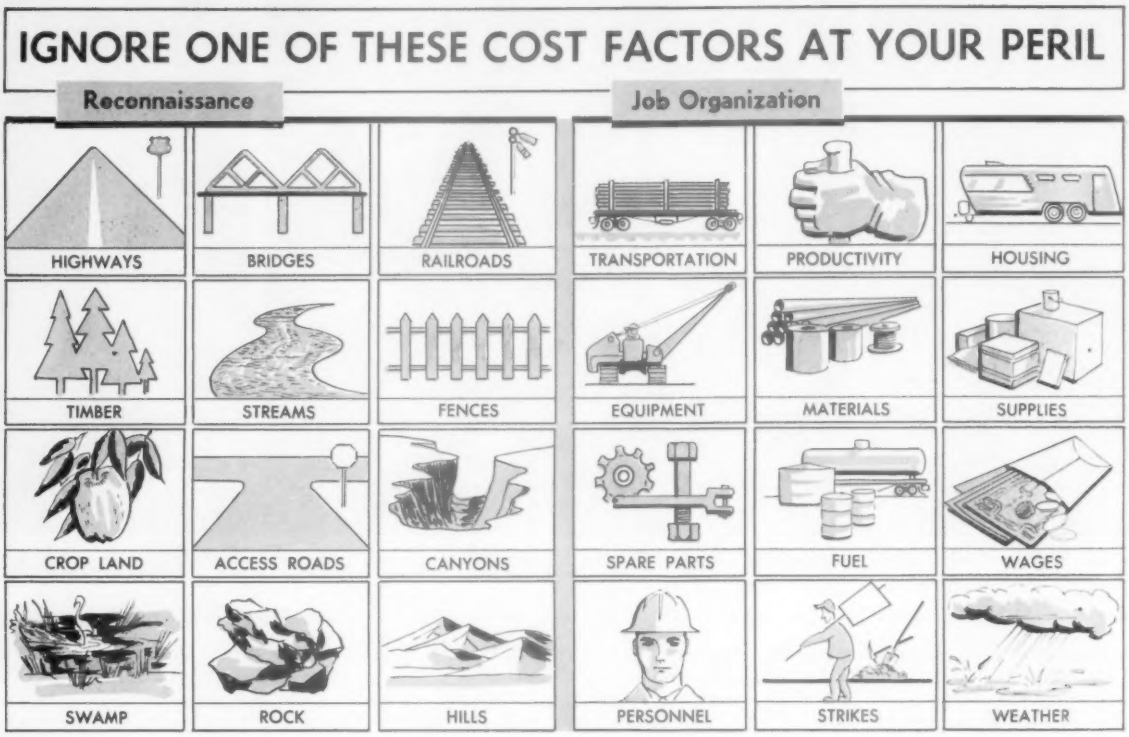
He then returned to Texas and directed the basketball program and assisted with football until his resignation in 1951.

What prompted this decision to enter pipeline construction, a field which had been foreign to Gray?

"While I was in service I had a lot of time to think," he explains. "I became interested in looking for a business besides coaching. After the war was over, I saw the tremendous pipeline-construction boom and this looked like the opportunity I was waiting for."

He joined with John Adams and R. L. Morrison in buying a small spread for small-diameter pipe from E. G. Morrison. They organized Morrison Constructors. In 1954 they made the move into the big time—big-inch pipelining with the purchase of a big spread of heavy equipment. In 1955 Grayco Constructors, Inc., was organized.

Gray has laid large-diameter pipe for such companies as Tennessee Gas Transmission Co., Texas Eastern Transmission Corp., and Trans-Canada Pipe Lines, Ltd., operating as Grayco Constructors Canadian, Ltd., on the latter job.



Many pipeline-construction pitfalls can be avoided—

if

...both contractor and pipeline owner are fair minded
...contractor reads specs, studies job, exercises good judgment
...both understand each other before job starts
...both are lucky

BY A. N. HORNE

... recently retired vice president and general manager of Texaco-Cities Service Pipe Line Co., now a pipeline engineering and construction consultant in Tulsa. He speaks from a background of 41 years' experience in construction, operations, and management. He has dealt with contractors in such important projects as the Big Inch and Little Big Inch lines, Trans-Arabian Pipe Line Co., Trans-Northern Pipe Line Co., and Basin Pipe Line System.

PIPELINE COMPANIES and pipeline contractors are in business primarily to perform a service, for which they expect to receive a fair and reasonable profit. This service we perform is an integral part of our national economy and our way of life.

These times of inflation offer a challenge to company and contractor alike. Perhaps this meeting will afford opportunities to develop better understanding which will contribute to the economic health of all.

During the past 41 years as a pipeliner, I have really worked for only two companies — Cities Service and Texaco—in design, construction, operation and maintenance of pipelines. But, during this time, it has been my interesting and happy privilege to be on loan from one or the other of these two companies with many interesting projects at home and abroad.

In the natural course of events, it has also been my happy privilege to know most of the pipeline contractors in the game. Many of you have had construction projects with my companies, and consequently we got to know each other pretty closely.

When I broke in running points on 6-in. tongs in 1919, some of the technical lingo and equipment jargon was: "stabber, collar pounder, growler board, backup man, jack man." The ditch was dug with pick, sharpshooter, and long-handled, round-point shovel. Two hundred fifty men could put together ½ to ¾ mile of 6-in. pipe in an 11-hour day. Sometimes the cold paint to be applied by hand brushing was conveniently dumped in the bottom of the ditch and covered up. Backfill was with a pair of mules and a mormon board.

My observations from the other side of the fence over the years lead to present conclusions that the pipeline contractor is indispensable to the oil

"Pipeline companies must have healthy, progressive contractors"

and gas industry and the national economy. Pipeline companies, more than ever before, need and must have healthy, progressive contractors, with adequate modern equipment and professional know-how, who are willing to take a chance, and be happy with a fair and reasonable return.

The business of pipeline - construction contractor is a hazardous one. It can result in satisfying rewards, with good management, good equipment, good personnel—and good luck. And, it can be otherwise, even to the best. Needless to say, I have seen many enter the game over the years. Some have been eminently successful, and others never got out of the woods.

My situation is somewhat like that of a lawyer, who, after years in a courtroom, finally becomes a judge of the court. Perhaps I can offer some observations and comments that may be of some value to the pipeline-construction industry.

I shall not attempt to tell you how to build a pipeline, because Section IV of the specifications, Paragraph 13, Page 46, subsection XYZ, states that: "Owner will not tell the contractor the manner, means, or method" of building the line.

I shall not try to forecast the immediate or distant future with reference to construction of oil, gas, and products lines. You should know by now exactly how many jobs you are going to get this year.

It is enough to say that because world production presently is ahead of world demand, the construction of crude-oil lines may be somewhat slow in the immediate future within the United States. Products and petrochemical lines will be on the increase, and natural-gas lines should be substantial. The upward spiral of labor and material costs is still with us. Therefore, careful planning, good management, and close attention to costs and economics are positively indicated.

Contractor-Ownership Relations

More than ever before, there is a profound need for closer working relations between the contractor and the pipeline owner.

The owner company cannot afford the huge investment in modern equipment necessary to build its pipeline. And it does not have the specialized talent or personnel and experience required to complete a project at a reasonable cost.

Competent, efficient pipeline-construction contractors cannot exist in the absence of fair-minded pipeline owners who are willing to concede a fair and reasonable earning for services performed, in keeping with the risks involved.

Over the past decade both oil and gas pipelines have been able to maintain reasonable transportation rates for the shipper and utlimate consumer, and in many instances have reduced rates, although labor and material costs have shown a steady, unrelenting increase each year. This has been accomplished mainly through improvement in design and methods, larger-diameter pipe, automation, and improvement in equipment.

At the beginning of this same decade, the pipeline contractor got as good or better prices per foot as now, and made fair and comfortable returns well in line with other industrial activity. Stated differently, he gets about the same price today as he did 10 years ago.

So, the contractor has been able to help the pipeline companies hold the line on transportation costs to the shipper and ultimate consumer remarkably well, in the face of labor and equipment increases of 70 to 100%.

To accomplish this, the contractor has been forced to more than double the footage of his daily production by better planning and supervision, improved methods, investment in more modern and expensive equipment, and by a strenuous effort to keep his equipment and people producing.

Formerly, there were fewer contractors in the game, and these perhaps became somewhat complacent. Now, there is a relatively greater number of contractors, due mainly to availability of more and better equipment, and competition is keen, with a lessening volume of work near at hand. This has possibly resulted in lesser take-home profits and decreased reserves.

All the foregoing adds up to the fact that the situation now and in the future demands a greater joint effort by owners and contractors, and a more careful and realistic approach to, and treatment of, a construction project.

Types of Clients

Contractors usually have three general types of clients to deal with.

On the one hand is the company with experienced personnel, capable of a practical, realistic treatment of design and execution. It knows that the lowest bid is not always the best bid, and is willing to pay a fair and reasonable price for top-quality work.

Dealing with this type of client is healthy for the company, the contractor, the industry, and the ultimate consumer.

Directly opposite to the first type of client is the company, perhaps newly organized, with personnel not quite so well seasoned, or more on the order of cogs in a theoretical, textbook-type machine. It may buy the job on price alone, or may demand more than set out in agreements.

The policy and management of the company may have the ruthless approach and execution, even in minor matters that may not be essential to good practice, or realistic as to intent.

A brutal, crap-table policy can spell disaster to the contractor in many situations, and can lead to discord, mistrust, and exhorbitant claims for extras. In plain words, it can cause each side to try to grab more goobers than the vine can produce.

The third type of client includes those in between the two mentioned, in varying degrees, one extreme to the other.

Types of Contractors

What has just been said about clients applies equally well to types of contractors.

On the one hand is the competent, well-qualified and equipped contractor, who carefully studies and calculates every angle of a project before making his commitment, and is then prepared to carry through to the complete satisfaction of the client.

On the other extreme is the careless or not - so - well - qualified and equipped contractor who may have bid the job too low, or through poor management, soon finds himself floundering in difficulties. And, the story from here on is usually a sad one for all involved.

Of course, any contractor may find himself faced with unforseen, catastrophic situations, but only those with adequate reserves can pull out of the mud and survive.

Before awarding a contract, an owner company must satisfy itself in all phases of the contractor's qualifications and his ability to perform. By the same token, the contractor must know his client. In some cases, discretion would indicate that some factors be spelled out more specifically before commitment is made.

Plans and Specifications

My observations have indicated far too many contractors bidding on a project have in the past given too little detailed study to the requirements of a set of plans and specifications. Likewise, ground reconnaissance of the

route has been entirely inadequate.

A common remark, frequently heard, "Aw, this is just the usual set of specs." And, a casual once-over frequently will not reveal factors that should have special study before a commitment is made. Stated simply, they may easily overlook or miss entirely, both in the specifications and on the ground, items or conditions that could lead to serious financial loss.

Considerable effort has been expended by both the contractor group and various pipeline companies toward development of a uniform set of construction specifications. Some encouraging progress has been made, but nothing as yet has come up which meets the needs or requirements.

Let us hope that such a document may be forthcoming soon. It will have to be joint effort of owner and builder. The welfare and economy of both groups over the next few years should force the issue.

There is a pressing need for a vigorous joint-interest organization to guide the common interests and objectives of pipeline owners and construction contractors. I fear the industry does not appreciate the vast amount of detailed investigations, planning, and calculations that enter into the preparation of a careful contractor's bid proposal.

Whereas, with the owner company, once the basic economics and justification of the project are established, all the other factors of engineering and design are reasonably well known, and can be set down in black and white, or slipped off a slide rule, or fed into a mechanical brain, and fairly positive answers are the result—all but the contractor's price and performance.

All too frequently the time allowed for a contractor to prepare his bid proposal is too short for a sound estimate of the situation.

The contractor is usually given a set of specifications and bid sheets 10 days or 2 weeks in advance and told that, although the line has not been staked yet, it will go from here to there. The bid sheets must be in tomorrow and the job must be kicked off yesterday.

First, after study of the plans and specifications, a thorough route reconnaissance must be made. This includes examination and tabulation of dozens of cost-controlling elements such as highways, railways, access roads, streams, bridges, timber, fences, farms, cattle, orchards, highway and railway crossings, hills, canyons, rock, living accommodations, and the various local conditions that could affect the progress of the job.

Next is consideration of equipment, manpower, pay rates, productivity, material, supplies, spare parts, fuel, and the numerous incidentals, contingencies, and allowances for unknown elements, such as weather.

In fact, almost every item of cost a contractor must consider and evaluate before committing on a sound bid proposal is influenced by variables and unknowns.

As likely as not, because of the limited time given by the owner, a contractor is forced to make a hasty estimate based on inadequate information and incomplete analysis. As a result, he may just send up a missile and hope it goes into orbit. This orbit could be expensive to the owner, or be disastrous to the contractor.

Yet again, a contractor may have ample time, but may delay or poke around, then send up a Lunik, which likewise could cost the owner too much, or break the contractor.

The time and the information given the contractor for investigating, planning, and making his bid can and should be improved in most instances—to the mutual advantage of all concerned. And, conversely, the contractor should move quickly when he gets a set of specs if he expects to be able to present a duly considered bid on time, one that he can live with.

"Joint conferences between responsible personnel of both contractor and owner can do much to explain plans and objectives and promote a clear understanding of specifications."

Contractor-Owner Conferences

A most important and frequently neglected aspect of contractor-owner relations is a simple matter of joint conferences between responsible personnel of both groups.

Such a conference could be set up for the day plans and specifications are given to prospective bidders, with top policy men, plus engineering and supervisory personnel of the owner, and responsible contractor people.

This meeting could do much to explain plans and objectives and promote a clear understanding of specifications.

After the prospective bidder has again studied the specifications and completed the route reconnaissance, he should meet engineering and supervisory personnel for further discussion and clarification of specific questions and items not clearly understood.

Then, most important of all, when the job is let, and before work begins, there should be a joint meeting between company field supervisors and inspection personnel and their opposite numbers of the contractor's force.

This conference should go into detail on all phases of construction, inspection, interpretation of intent of the contract, extras, special situations, procedures, channels of communication and authority, and individual responsibility.

I have personally sponsored and arranged such meetings and have invariably found them invaluable to owner and contractor alike in promoting smooth operation and top quality results.

I shall cite one example—a 300-mile, 22-in. project, which was a one-spread job, due to pipe delivery.

At kickoff, a meeting was arranged with all responsible field personnel of owner and contractor present, followed by a pleasant get-together dinner. The owner supervisory and inspection personnel were paired off with their opposite numbers from the contractor force in a comfortable conference room, each person having before him a copy of the plans and specifications.

The specs were carefully read, and the requirements discussed in detail,

Pipelining Tomorrow

. . . as the author sees it

I have not attempted to enumerate the many technical advances and improvements in pipeline design, nor the obvious results of modern equipment and methods in pipeline construction. It can safely be said, however, that these changes and improvements will continue. Some ofthese new things will be more than impressive and they may bring great changes in pipelining.

Aerial Survey

On the way is an aerial-photographic method giving a continuous strip with low-level 3-D color pictures of the pipeline route, together with the corresponding profile line, accurate to within a few feet. This should be a great help to a contractor's plans and estimates.

Welding

Out of the three to four dozen welding methods now known will come a simple, rapid and dependable method of welding the field joints of pipe, with a very reasonable cost. This answer is to a contractor's dream could well come through further evolution and development of the high-frequency resistance and induction-heating methods.

Ditching

The location, depth, character, and thickness of underground rock is rapidly becoming a scientific fact, so far as the pipeline contractor is concerned. Further evolution of seismograph and electrical-survey methods will make the rock clause something else to talk about. Improvements in rock-ditching equipment and methods will be rapid and sure.

Pipe

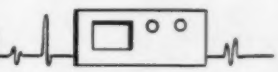
On-the-job fabrication of pipe from sheets or plate and strip rolls is more than a probability. This would be done at locations equivalent to present-day railhead stockpile locations.

Continuous, on-right-of-way fabrication of spiral-weld pipe of any size, and suitable for any purpose is more than a dream. It will come sooner than we think.

Coating

Drastic improvements in coating materials and methods, inside and out, are on the way. Out of the hundreds of petrochemicals, resins, and plastics the contractor will have a coat-and-wrap job that can be done by a handful of men—and dampness or moisture or temperature will be no handicap.

Automation



Automation has been one of the greatest advances in the pipeline industry, next to large-diameter lines.

A recent issue of a technical magazine states that today the U. S. A. has fewer than 50,000 people trained in the technologies of instrumentation and automatic control, and that in the next decade 3 million will be needed. This estimate emphasizes the trend in all industry, and this impact will obviously continue in the design, construction, and operation of pipelines. The type of personnel in construction and operation will change drastically.

Contract Maintenance

Contract maintenance of pipelines is making headway slowly but surely. For gathering systems it is relatively easy to organize and set up. But a single trunk line over a long distance poses problems.

Contract Operations

Contract operation of pipelines, or phases thereof, can be a matter of increasing interest to the contractor, particularly as automation progresses. Aerial line patrol is an indication of what has been accomplished in this direction. Even leasing station equipment is a possibility.

including the "whys and wherefores" of the plans or the reasons for doing it that way. This gave everyone a chance to become familiar with every phase of the operation.

The chain of command and channels of communication were set up, and procedures outlined for immediate, daily, on-the-ground solution of problems, and settlement of any differences, changes, extras, or special situations, with work orders to be written on the spot, when agreements were reached.

At the end of the job, for final closeout, there were no hang-fire extras, specials, or late force account items. There were no arguments or misunderstandings, and everybody was happy with the job, the job performance, and the job relations.

Dependable automation instruments are here for chemical process plants

. . . it's only a matter of sound economics to take advantage of them

BY PORTER HART
Dow Chemical Co.

THE FIELD of instrumentation in the process industry is changing so fast that you will be left behind if you are not alert and progressive. Every year we see new concepts and ideas advanced in instrumentation that, to some, make little impression because they are not fully understood. This is why good "automation planning" is needed, as an aid to help systematize research, development, and engineering groups. The knowledge and skills in many areas of science and engineering are involved.

New, more dependable electronic instruments, computers, and continuous stream analyzers will gradually replace the individual process variable controllers in chemical process plants. The workable equipment is now available; it is only a matter of economics in using it.

Electronic controls. Up until now, electronic control systems have been avoided wherever possible, because of the short life of electrical components such as electrolytic condensers, vacuum tubes, and resistors. Recent developments of solid-state circuitry have made electronic control systems more dependable. With these new systems having components such as magnetic amplifiers, transistors, silicon diodes, tantalum condensers, etc., the instrument companies have on the market today electric control systems that should operate without failure for more than 10 years.

Most control valves will be operated pneumatically with electric-to-air transducers. Electric valve operators that are now available do not have the power, positioning, and speed of response for good process control.

The analog-type computer has been used for a long time in chemical process control. Every control loop having throttling range, reset, and rate adjustment is an analog computer which continuously monitors and automatically corrects adjustments. This type of instrument has only one input and one output and is now being used for static-state control of present plants. This system cannot possibly keep a reactor or fractionator continuously operating at its maximum efficiency and productivity at all times if we are to depend upon decisions of the operator for making these controller adjustments.

Since the complexity of chemical plants has increased, the necessity of computers with a wide band of intelligence becomes necessary. The operators must be relieved of making human decisions as to the adjustments on the controllers. "In process" computers can make more and more decisions for us. They can take the information on an operating unit, boil it down, and feed it back into the control loop.

Analog computer. The operating hardware of these computers is now available, and it is a question of economy, not accuracy, as to the use of analog or digital systems. The cost of an analog computer that will solve one equation is approximately $2,500, and the cost of an analog computer which will solve a number of equations would be a direct multiple of this figure.

Digital computer. A digital computer is far more expensive, but it is more economical to use if you have, say, 80 useful equations to solve. A digital computer of this type costs approximately $80,000, so the cost of each of the 80 equations would be approximately $1,000. The more equations you would have to solve, the cheaper this cost would become because the digital computer makes one computation at a time and shares the circuitry used in the instrument.

The analog is not a variable of time, but the digital is and may require as much as 5 minutes for solving 80 equations. Pneumatic computers have also been developed that are very good and more economical than either of the electric systems. For simple equations, their application should always be considered. Don't sell pneumatic systems short as analog computers!

The analog and digital systems both definitely have their place for process computer control use. The real problem is a mathematical statement of the process. This may require many months of system study by a group. If the whole process is studied, the cost may prove to be as much as the computer itself. The pattern of computer control in the chemical process industry seems to be fairly well established, but we must use caution in its application. Promising too much, too soon, could lead to serious setbacks.

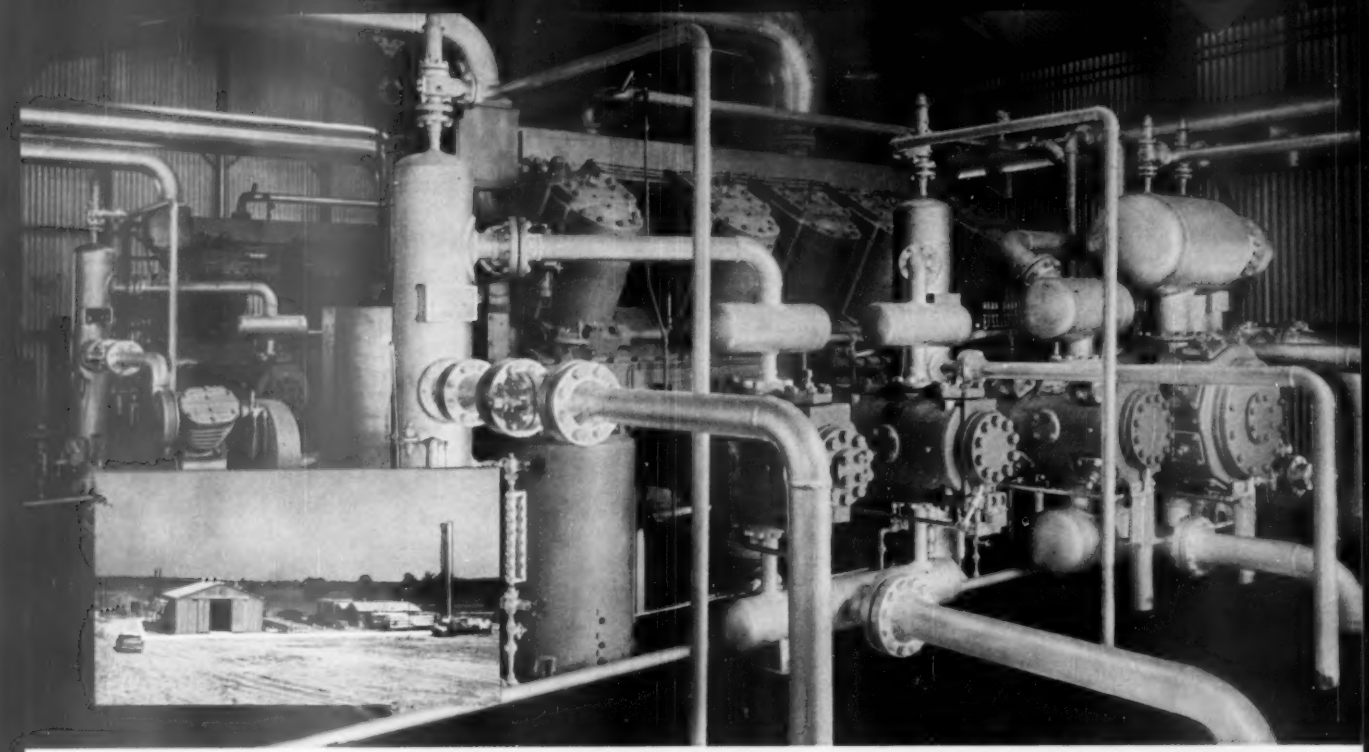
Process-stream analyzer. The chemical process plant has been successfully operated a long time without the use of a computer for setting its controllers, especially those plants that make good use of the continuous-process stream analyzer. Of course, instrumental analysis is also needed to make computer operations practical in the process plant. The information from the analyzer could either be fed into the computer or used to check its operations.

During the next few years, at least, computers will not replace the individual process variable controllers, but they will gradually be used to provide intelligent settings for such controllers, settings that will provide for the best operations.

On new plants, this will be an entirely different problem. The plant will be simulated mathematically on the computer with the control system that will be used on the actual plant. The compatibility of the complete system can then be tested. Sizes of the equipment can be changed during simulation and its behavior tested as an aid to research, engineering, and operations.

Presented at AIChE meeting, Galveston, Tex., 1959.

BEAIRD-INGERSOLL-RAND Packaged Compressor Plant



Tatum Gas Plant equipped with two Beaird-Ingersoll-Rand 10SVG 550 h.p. packaged compressors. Units are complete with all necessary controls for unattended operation. Other sizes from 120 to 660 h.p.

Packaged Compressor Equipped...

GAS PROCESSING BOOSTS FIELD ALLOWABLES

Robert Cargill, operates this gas processing plant in the Tatum-Petit Field. Located just outside the city limits of Tatum, Texas, the field has grown from a single wildcat to 75 producing wells in less than three years. During this swift expansion it became evident that the increasing number of high gas-oil ratio wells would curtail oil production unless a means was provided to conserve the excess gas. An additional problem was created by the wide variation of wellhead pressures which ranged from 25 psig. to 650 psig.

Engineers called in by Robert Cargill solved the production problem by designing a gas processing plant to remove heavy elements as marketable by-products and to boost the dry gas to a nearby sales line. Two Beaird-Ingersoll-Rand 10SVG 550 horsepower packaged compressors were selected for the main station. Each compressor has been engineered to handle both low and high pressure streams. Low pressure gas is boosted through three compression stages then tied into the discharge of the fourth cylinder which boosts the high pressure stream. The plant can process 20 mmcfd. at 850 to 1,000 psig. discharge with its present arrangement.

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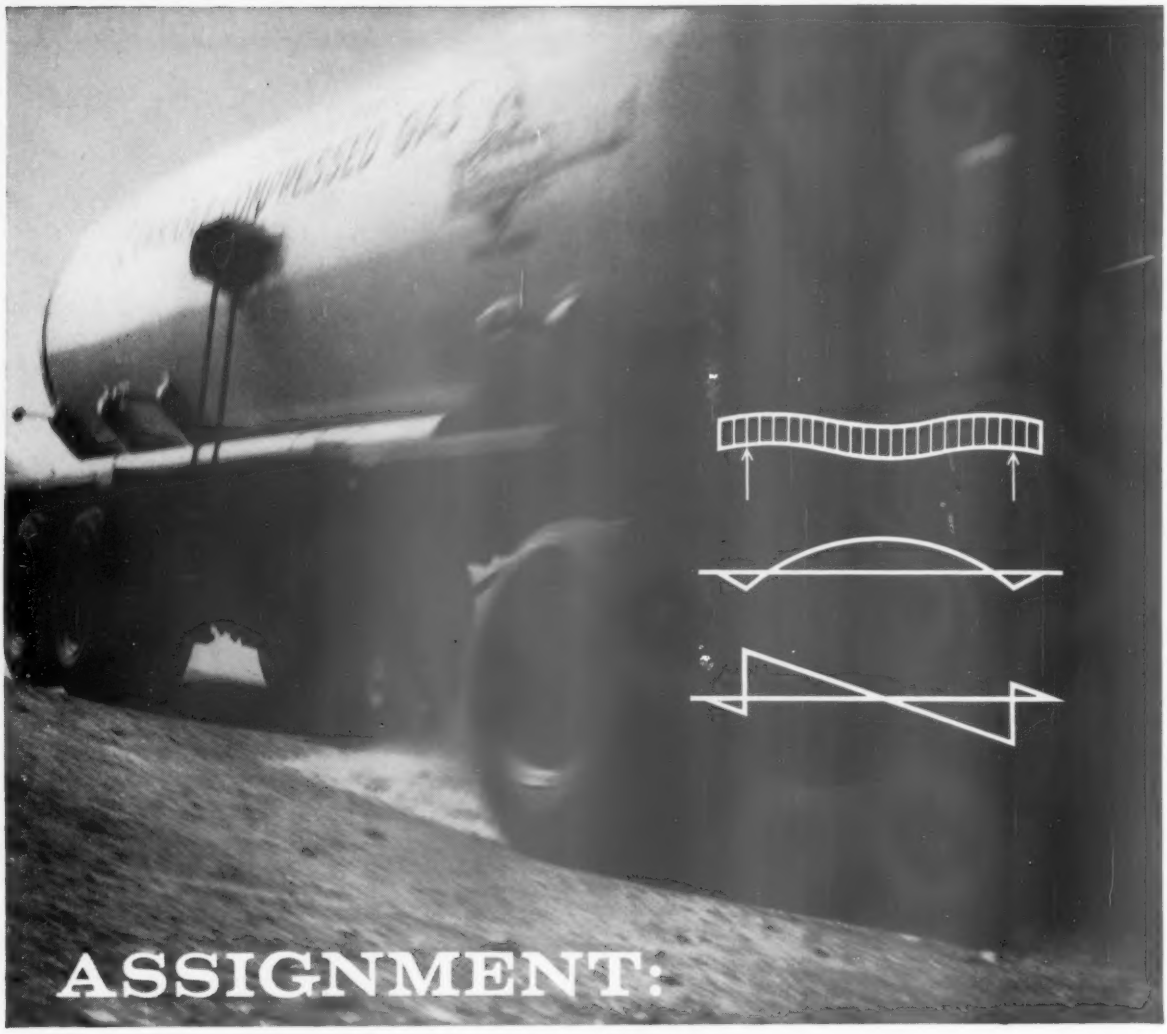

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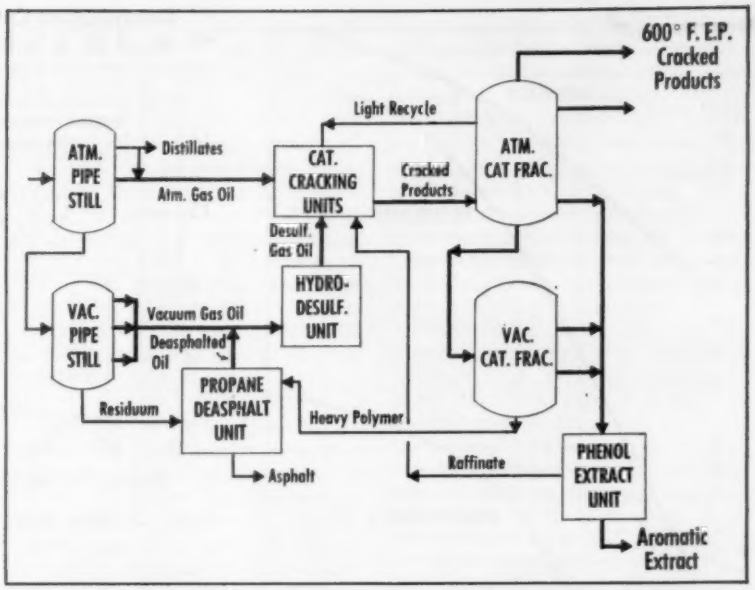
ASK FOR THE LUKENS "T-1" STEEL BULLETIN

BY K. K. McMILLIN
Humble Oil & Refining Co.
Baytown, Tex.

The system described in this article has increased production of premium and regular grades of gasoline and of petrochemical raw stock, primarily at the expense of crude oil. Treating costs of cracked products have been minimized and sulfur corrosion in subsequent processing equipment has been reduced.



PROCESS FLOW for catalytic cracking feed-preparation units at Humble's Baytown refinery. Fig. 1.

Processing feed stocks for cat cracking

USE of separation and treating processes to prepare charge stocks for catalytic cracking has gained in importance during the past few years. There is incentive to get more virgin cracking feed by upgrading heavier portions of the crude and, concurrently, to improve cracking characteristics of major virgin feed streams by pretreatment methods. As increased catalytic cracking capacity has become available, feed preparation of recycle stocks has also been used to give improved product distribution.

Over a period of years Humble Oil & Refining Co. has evolved a system of treating at its Baytown, Tex., plant to prepare catalytic cracking feed stock:

Treating operations include:

- Vacuum distillation of gas oils.
- Deasphalting of residuum.
- Hydrodesulfurization of sour gas oils.
- Distillation of cycle stocks.
- Phenol extraction of cycle stocks.

Process flow is shown in Fig. 1.

Vacuum distillation. There are four combination atmospheric and vacuum pipe stills at the Humble refinery which, in addition to lube-crude service, charge about 240,000 bbl. per day of fuel-products crude. Sweet and sour crudes are processed in segregated operation on separate pipe stills. The vacuum towers are primarily used to recover heavy gas oils from reduced crude. Product sidestreams are normally combined at each tower. Vacuum gas oil from sweet crudes is sent directly to feed-tankage systems at the catalytic cracking units, while that from sour crudes is routed to hydrodesulfurization.

There are two primary limitations on the yield of gas oil from vacuum towers. Physical limitations are imposed by the minimum pressure in the flash zone as dictated by the vacuum source and the tower pressure drop. Flash-zone temperature is restricted to a maximum to prevent thermal cracking in the furnace and coking in the lower trays of the tower.

There is an indirect limitation on the cut point of the lower sidestream which is related to the heavy metal contaminant carryover by entrainment and volatilization. Information presented by Johnson, Mills, and Benedict[2] shows that metal contaminant and carbon residue of deep vacuum-flashed residua increase exponentially with cut-point temperature. Confirming evidence for volatile nickel and vanadium distribution with cut-point temperature is shown in Fig. 2 for vacuum residuum derived from West Texas crude.

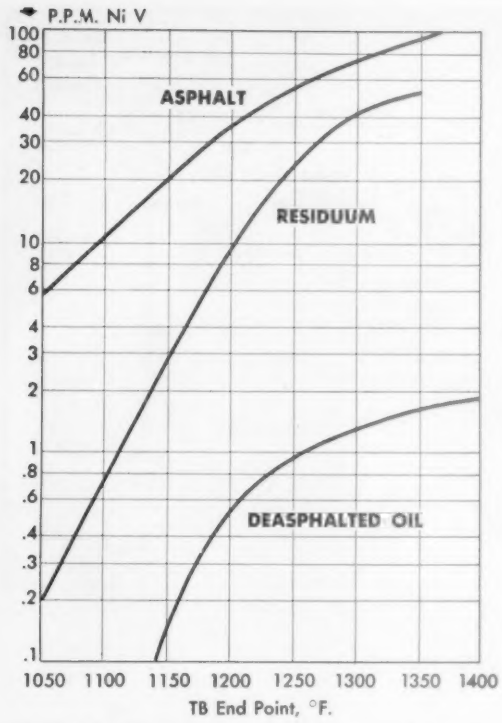
Deasphalting of residuum. Physical limitations and metals carryover from the vacuum pipe still restrict the gas-oil recovery from residua. Several processes have been developed to recover good-quality gas oil remaining in the vacuum residuum stream. The deasphalting process is being used commercially to extract high-boiling gas oils[1 7 8] and the fluid coking process is being successfully used to upgrade the total residuum fraction[9 10]. Hydrogenation of reduced crude and of vacuum residuum has been studied and offers commercial feasibility[5 6].

Deasphalting of vacuum residua from fuel-products crude is a liquid-liquid extraction process using propane-butane solvent. The deasphalting unit at the Humble refinery uses parallel extraction towers and has a charge capacity of about 30,000 bbl. per day of average residuum.

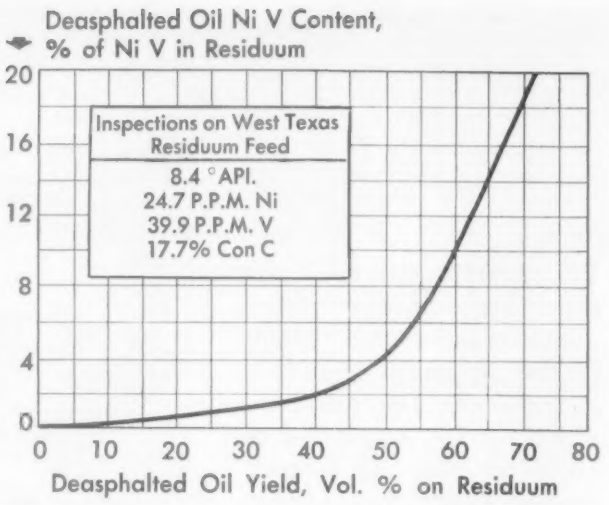
The propane-deasphalted oil phase is taken overhead, and the product oil, after solvent removal, is subsequently charged to the hydrodesulfurization unit. The asphaltic residue withdrawn from the bottom of the tower is blended to fuel oil.

Deasphalting has been compared to deep vacuum flashing by Johnson, et

Paper presented at the fifty-second annual meeting of AIChE, San Francisco, 1959.



COMPARISON of volatile nickel and vanadium content with cut-point temperature for vacuum residuum derived from West Texas crude. Fig. 2.



EFFECT OF YIELD LEVEL on the quality of deasphalted oil. Fig. 3.

al[2]., as a means of deriving high-boiling catalytic-cracking feed. This study showed that deasphalting decreased: (1) aromatics, (2) nickel and vanadium, and (3) Conradson carbon. Fig. 2 shows the selectivity of the deasphalting process for rejecting heavy metals into the asphalt phase.

Despite the decreased concentrations of metals in the deasphalted oil product, the poisoning effect of trace amounts of these materials limits the recovery of cracking feed by the deasphalting process.

The data of Lawson, Peet, and Peet[8] presented in Fig. 3 show that an increase in yield in the economically attractive range from 40 to 60 vol. % is accompanied by a fivefold increase in metal concentration. The effect of yield level on the quality of deasphalted oil has been recognized by other investigators[2 11]. Conradson carbon, sulfur, and nitrogen content increase with yield level but at a lower rate than heavy metals.

Because of the importance of minimizing catalyst contamination in the cracking operation, consideration was given to modifications of the deasphalting process to improve its selectivity. This work led to the development of a "wash" operation[15 16 17]. In plant practice, the residuum charge is fed at about the middle of the deasphalting tower and a "wash oil" is injected near the top section. The wash stream consists of very high-boiling aromatic polymers currently derived from vacuum distillation of heavy catalytic cycle stock. The aromatic wash contacts the solvent-rich phase and flows countercurrent down the tower.

Due to the affinity of the aromatic phase for the metallic components, the wash operation removes an additional 60% of heavy metals from a fixed yield of deasphalted oil. Both reduced thermal tar and heavy catalytic polymer have been successfully used in the wash opeartion described by Lawson, et al[8]., as presented in Table 1. These data show that additional metals reduction can be obtained by increasing the wash-oil rate, and for the ranges studied no marked leveling off of this effect was noted.

It has been found necessay to vacuum distill or flash the polymer-wash raw stock to decrease its solubility in the propane-deasphalted oil phase. The lower-boiling aromatics decrease selectivity of the wash stream and increase aromatic content of the deasphalted oil.

Hydrodesulfurization. Vacuum gas oils produced from sour crudes and deasphalted oil extracted from average residua are high in sulfur. The most effective and economical means of sulfur removal is hydrotreating of these high-sulfur charge stocks with byproduct hydrogen prior to catalytic cracking[4 5 6 12 13]. Byproduct hydrogen from catalytic reformer offgases has a value of about 5 cents per M.c.f. in its alternate disposition as fuel, whereas the grass-roots cost of manufacturing hydrogen for refinery use is in the order of 15-25 cents per M.c.f.

Another contributing factor has been the development in recent years of improved hydrogenation catalysts which are resistant to deactivation by sulfur, nitrogen, and trace metals.

Our plant hydrodesulfurization unit charges about 50,000 bbl. per day consisting of about 65% high-sulfur gas oil and 35% deasphalted oil. The hydrodesulfurization of catalytic cracking feeds results in an improvement of the cracking characteristics in addition to the removal of sulfur. Table 2 gives average inspection and quality improvement from the hydro-

TABLE 1—EFFECTS OF POLYMER WASH ON DEASPHALTED OIL QUALITIES

Nominal deasphalted oil yield, vol. %	50			60		
Per cent wash oil (based on resid.)	0	14.8	26.0	0	17.5	44.3
Actual deasphalted oil yield, vol. % (based on resid.)	47.5	50.8	57.8	60.4	62.9	64.5
Deasphalted Oil Inspections						
Deasphalted Oil Inspections						
Specific gravity, 60/60° F.	0.9459	0.9503	0.9529	0.9578	0.9672	0.9634
Conradson carbon, wt. %	3.8	3.4	3.3	5.3	5.4	4.5
Nickel, p.p.m.	1.60	0.39	0.28	3.04	0.85	0.38
Vanadium, p.p.m.	2.12	0.41	0.29	4.52	1.12	0.52

treating of catalytic cracking charge stocks. Particularly significant is the indicated removal of Conradson carbon, heavy metals, nitrogen, and aromatics from the feed stock.

Principal effects of hydrotreating on subsequent catalytic cracking operations are shown in Table 3. Base credits for hydrodesulfurization include an increase in gasoline yield and octane quality and a decrease in carbon yield. Naphtha octane increase at high level on a major motor-gasoline component carries an appreciable credit.

Table 3 also shows the effect of hydrotreating 50,000 bbl. per day of gas oil as an incremental balance of primary fuel products. The net effects are an increase in premium-grade motor gasoline and a reduction in residual fuel oil. These product-distribution credits are accompanied by savings in maintenance and operating cost in the product-finishing train.

The lower carbon-producing tendency of hydrotreated stocks may be used either by (1) increasing charge rate to the cracking unit, or (2) by increasing conversion and improving product distribution at a fixed charge rate. Removal of heavy metal contaminants and Conradson carbon affords improved catalyst-quality maintenance at the cracking unit.

A more economical operation to take advantage of reduced metals and Conradson carbon is to increase oil yield at the deasphalting unit from 50-55 to 60-65%. Substantial credits are associated with this incremental recovery of good-quality cracking stock from residuum.

TABLE 2—HYDROTREATING OF HEAVY GAS OIL FOR CATALYTIC CRACKING

Feed: 65% high-sulfur gas oil 35% deasphalted oil	
Feed inspections:	
Gravity, °API	20.9
Viscosity, S.U.s. at 210° F.	64
Sulfur, wt. %	1.8
Conradson carbon, wt. %	2.4
Nitrogen, wt. %	0.1
Nickel, p.p.m.	0.4
Vanadium, p.p.m.	0.4
ASTM distillation	
20%	743
50%	888
80%	1,060
Quality improvement from processing	
Sulfur removal, %	70-80
Conradson carbon reduction, %	40-50
Metals removal, %	60-70
Nitrogen removal, %	20-30
Aromatics reduction, %	10-20

TABLE 3—CATALYTIC CRACKING OF HYDRODESULFURIZED GAS OILS

At 50% 430+° F. Conversion	
Carbon yield decrease, %	20-25
Naphtha yield increase, %	5-10
Naphtha octane increase	
Research + 3 cc. TEL	1.5
Motor + 3 cc. TEL	2.8

Major Effects on Primary Fuel Products (Based on 50,000 B/D Hydrotreated Gas Oils)	B/D
Premium motor gasoline	2,540
Heating oil No. 2	130
Butanes	950
Butylenes	280
Residual fuel oil	(3,225)

TABLE 4—PHENOL EXTRACTION OF HEAVY CYCLE STOCK

Inspection	Feed	Raffinate	Extract
Yield, vol. %	100	58	42
API gravity	19	35.5	1.8
S.U.s./210° F.	41.8	39.1	51.8
Aromatics, wt. %	46.4	11.2	84.6
Conradson carbon, wt. %	2.5	—	5.2
Diesel index	30	78	2

Distillation of cycle stocks. Reaction products from catalytic cracking include components ranging from inerts and hydrogen through cracked fractions boiling as high as 1,200° F. Primary separation of the cracked products is made in an atmospheric fractionator where components boiling below 400° F. are taken overhead. Catalytic heating oil, 600° F. e.p., and light cycle stock, 700° F. e.p., are taken as sidestream products. The light cycle stock may be used as a marginal feed to the catalytic cracking unit or as a fuel-oil fluxing stock.

Catalytic fractionator bottoms containing high-boiling aromatics are sent to a vacuum tower where polymer wash for the deasphalting unit is produced as vacuum-tower bottoms. Heavy cycle stock is cut as sidestreams on the vacuum tower. This stream serves as recycle charge stock to the catalytic cracking unit.

Phenol extraction. Catalytic cycle stock has a substantial aromatic content. Cracked stock is much more refractory than virgin feed and requires several passes through the cracking unit for complete conversion into lower-boiling components. The refractivity is primarily caused by the high-molecular-weight, aromatic hydrocarbons which cause excessive formation of undesirable gas, coke, and tar during catalytic cracking[3 41]. The phenol-extraction process separates polynuclear and condensed-ring aromatics and concentrates them in the extract phase. The raffinate phase primarily contains the paraffins and naphthenes along with a small concentration of sidechain aromatics Table 4 gives representative yields from 90% treat operations of a typical cycle-oil feed[14].

Phenol extraction for the low-yield operation shown in Table 4 produces a raffinate which is superior to virgin gas oil in its cracking characteristics. This is due to the fact that all condensed-ring aromatics are in the extract phase. It is economically attractive to operate at a higher raffinate yield than this.

Our phenol-extraction plant has a capacity of about 30,000 bbl. per day of cycle stock. Extraction is accomplished in countercurrent centrifugal stages, where the heavier extract phase is separated from the raffinate. Feed to the phenol plant consists of heavy cycle stock from the catalytic vacuum tower with steam-stripped light cycle stock from the atmospheric tower used to fill marginal capacity.

Raffinate feed to the catalytic-cracking unit is lower in volume, refractivity, and carbon-producing tendency than the former cycle-stock charge. Phenol extraction not only effects an improvement in product distribution but also makes cracking capacity available for other marginal feed stocks which replace the detrimental heavy aromatics. In addition, the highly aromatic extract has specialty disposition and commands a price premium over its alternate disposition as residual fuel oil.

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How to reduce drilling costs

. . . a new Journal series on drilling practices and how these practices affect well costs

THE OIL INDUSTRY is emphasizing a need for reducing expenditures. Production capacity has been curtailed, and to maintain a reasonable return of profits to investors it is necessary to reduce current operating expenses and to limit capital investments. This situation has introduced a new need for economy which has focused attention on procedures by which the relative rate of expansion can be maintained at less cost.

To reduce costs, operations have been consolidated, personnel have been relocated, and many have chosen early retirement. New investments have been appraised more critically and there has been an increased tendency to delay the drilling of new wells. This has been shown through a reduction in drilling operations throughout the industry in both domestic and foreign operations.

One reason given is that developed oil and gas reserves reduce the need for additional capacity. Another reason is that drilling costs are too high in many areas to justify drilling wells that must be produced at a small fraction of their capacity.

As a result of high drilling costs and limited funds for capital investments, a company may be forced to farm out blocks of proven acreage. These acreage blocks generally consist of those that show a low rate of return versus initial cost and are in areas where primary lease terms are expiring. In calculating rate of return, well costs are generally based on past average costs in the area and all too often new techniques for reducing costs are overlooked. New techniques might be more appropriately termed old techniques that have received little application.

Drilling—art or science? There is no doubt that in the initial application of methods to drill wells the primary technique of drilling was learned through practice. This established drilling as more of an art than science, and even with scores of individuals engaged in research on how to improve drilling practices, the feeling that drilling a well is primarily a function of art rather than science persists. Today, however, both the art and science are needed if drilling costs are to be reduced to a minimum level.

This minimum level is the end result of applying all the known practices for reducing drilling costs. In many cases the application of all these practices will result in a 30 to 40% reduction in well costs.

Effect of Initial-Cost Reduction

To demonstrate the effect of reducing initial well cost on annual profits a set of conditions has been assumed and annual rate of return calculated by the discounted cash flow method. In this example, income tax has been omitted; therefore the results are qualitative rather than quantitative for a specific operation.

BY PRESTON L. MOORE

. . . assistant professor of petroleum engineering, University of Oklahoma. He is a consulting engineer, and is on retainer for Jersey Production Research Co. Before joining the OU staff, Moore was senior petroleum engineer with Humble Oil & Refining Co., Houston. While with Humble, he worked on drilling-practice problems for several years. Moore holds BS and MS degrees in petroleum engineering and is a graduate of Humble's reservoir-engineering school.

Assumptions:

Well depth = 6,000 ft.

Well cost = $84,000.

Recoverable oil per well = 60,000 bbl.

Production rate = 20 bbl. per day for 4 years.

Rate of decline thereafter = 3% per month.

Editor's Note

The watchword in the oil business these days is: REDUCE EXPENDITURES. Drilling is no exception to this rule, and perhaps costs are being watched here more than anywhere else.

The reason is obvious. If initial cost for sinking a well is so high that the well shows little or no return, the well won't be drilled. If the outlay can be cut to the point where a reasonable profit is indicated, there is a good chance that the well will be drilled.

This series, then, is dedicated to cost reduction in drilling. Future articles will deal with costs in these areas:

- Optimum bit weight and rotary speed.
- Fluid circulation and hydraulic horsepower.
- Effect of fluid properties on drilling rate.
- Bit selection.
- Off-bottom time.
- Lost returns, sloughing shale, crooked hole, and differential-pressure sticking of drill pipe.

Economic limit = 5 bbl. per day.

Producing expenses = $375 per month.

Selling price of oil (7/8ths) = $2.50 per bbl.

Total producing life of well equals 4 years at the constant rate of production, plus the years at which the well produces at a declining rate. The time on decline may be calculated using the formula for constant percentage decline as follows:

$$q = -a\, dq/dt$$

Integrated between the limits of $(q_i, t = 0)$ and (q, t):

$$t = a \ln (q_i/q)$$

a = 1/(monthly decline rate fraction).

q_i = rate at beginning of decline, bbl. per month.

q = rate at economic limit, bbl. per month.

t = producing life in months.

Using the above conditions the time on decline is calculated as follows:

$$t = (1/0.03) \ln (600/150)$$

$$= 46.2 \text{ months}$$

From this, the annual rate of return can be estimated from the cash flow method, as follows:

Year	Gross Production, bbl.	In dollars: Well cost	Gross income	Operating expense	Net income	Net cash flow
1	7,300	88,000	18,250	4,500	13,750	−74,250
2	7,300	.....	18,250	4,500	13,750	13,750
3	7,300	.....	18,250	4,500	13,750	13,750
4	7,300	.....	18,250	4,500	13,750	13,750
5	7,300	.....	18,250	4,500	13,750	13,750
6	7,300	.....	18,250	4,500	13,750	13,750
7	6,070	.....	15,175	4,500	10,675	10,650
8	4,200	.....	10,500	4,500	6,000	6,000
9	3,060	.....	7,650	4,500	3,150	3,150
9 5/6	1,665	.....	4,160	3,750	410	.....

The equation:

$$\frac{S_1}{(1+i)^{0.5}} + \frac{S_2}{(1+i)^{1.5}} + \frac{S_3}{(1+i)^{2.5}} + \ldots \frac{S_m}{(1+i)^{m-0.5}} = 0$$

may be used to determine rate of return on the investment.

S_1, S_m = Net cash flow for year 1, and for year m, respectively.

i = Rate of return.

Using this method, the annual rate of return is 5%. This is below a safe level of return and most companies would not drill this or any group of wells in the area. Their alternatives are now to either attempt to farm out the locations, drop the lease outright, or reduce the well cost. The last-named alternative is chosen if well costs are reduced to about $60,000. Certain risks may have been taken and practices that would ordinarily be termed not good oil fielding have been followed. However, by substituting an initial well cost of $60,000, the average annual rate of return is 20%.

Costs can be reduced. A reduction in well costs by less than one-third has been responsible for 4 to 1 increase in the annual rate of return. The significance of this increase in rate of return as a result of lower well costs is emphasized when it is realized that reductions in well costs by this amount are possible in many areas. A review of specific well costs within an area will frequently show that one operator's costs are one-third less than those of another operator.

This difference may be explained by the acceptance of new ideas and the application of known cost-reducing practices. For example, an operator may not consider it good practice to drill small holes or produce through small casing without tubing; however, if this change is necessary to reduce initial cost before drilling can be justified, then there is no alternative.

There does not appear to be any reason why one operator can drill and complete a well at a cost sharply below other operators in proven development areas. Yet examples of where this is being done could be cited in all areas of the United States. Explanations to management generally consist of a standard set of excuses. To maintain its competitive position in industry, a company can no longer afford excuses.

Costs must be reduced and they can be reduced if industry will assume interest in drilling comparable to that extended reservoir-analysis work 10 years ago. Engineers were responsible through planned programs of pressure-maintenance and secondary-recovery projects for saving millions of barrels of oil that might have been lost. The same talent is available in young men entering industry today; the problem may be even bigger.

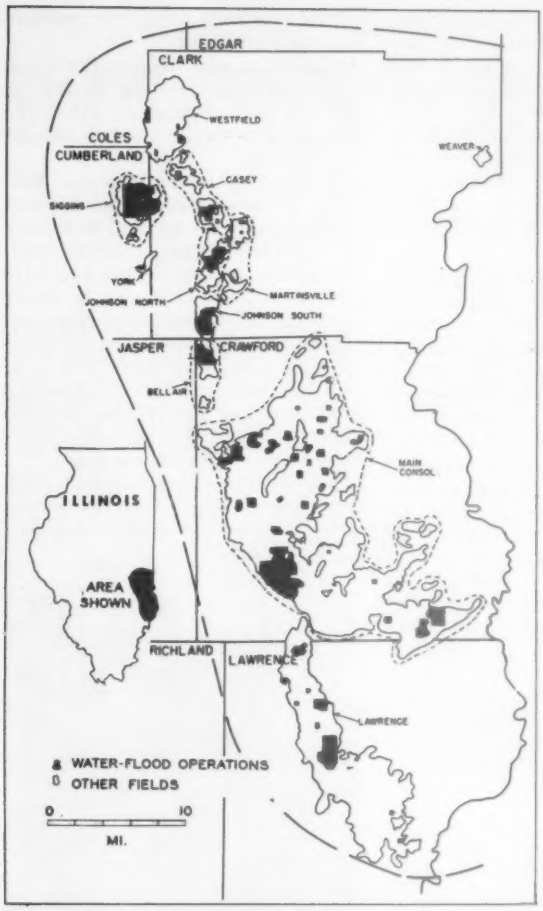
Expansion may depend on well cost reductions. Staying in the oil business may depend on expansion, because many have found it difficult to stand still.

When using young men and their ideas, the stock answer that this was tried several years ago and costs were increased will no longer suffice. Centrifuges for recovering barite were utilized in the 1930's, but it wasn't until the 1950's that they were accepted as an established aid to reducing mud costs. Gyp muds were used and their use discontinued before the introduction of efdQ-Broxin, the first effective thinner for this type mud. Now they are in common usage.

Improvements in drilling have made it possible to apply many techniques today that would have been unsuccessful in the past.

Here's a handy header for a butane line

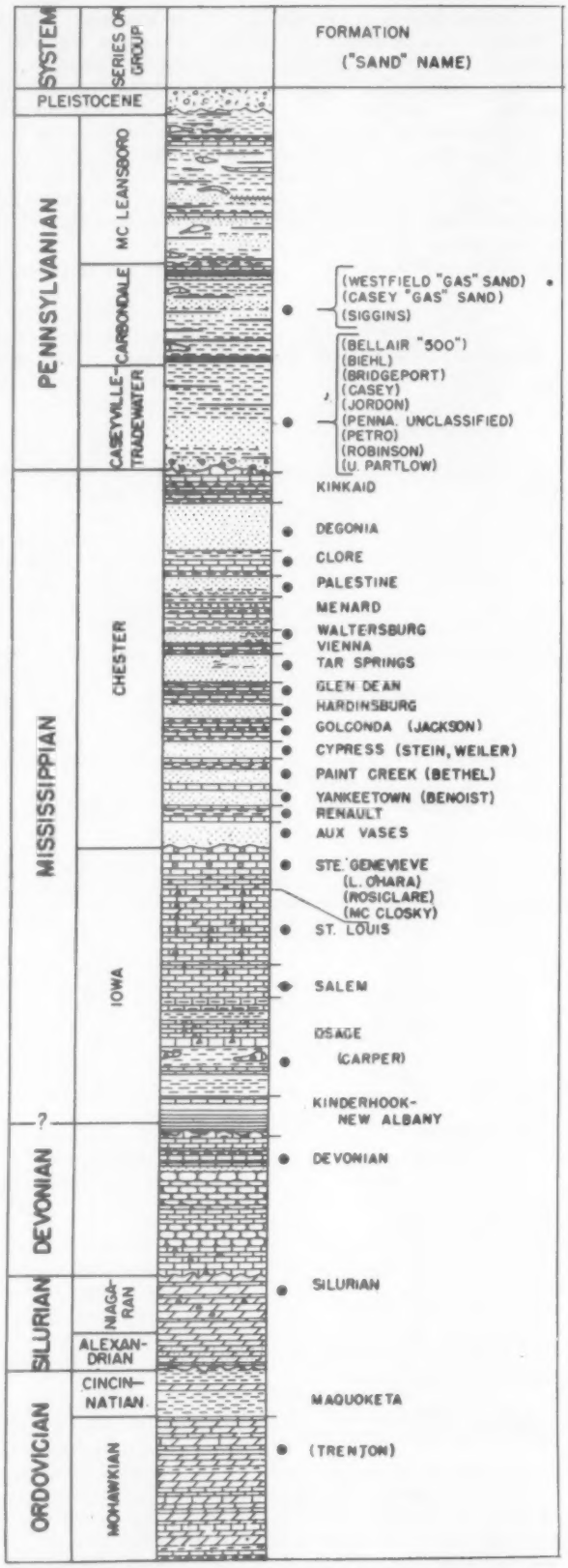
. . . that's in use at Hallmark Petroleum & Drilling Co.'s Rig 5 now working in Kay County, Oklahoma. The header is sealed in the middle to keep the gas and liquid apart. The right half takes liquid butane from the bottom of the storage drum to fuel the drilling engines. The line on the left side takes gaseous butane from the top of the drum to fire heaters on the rig floor.



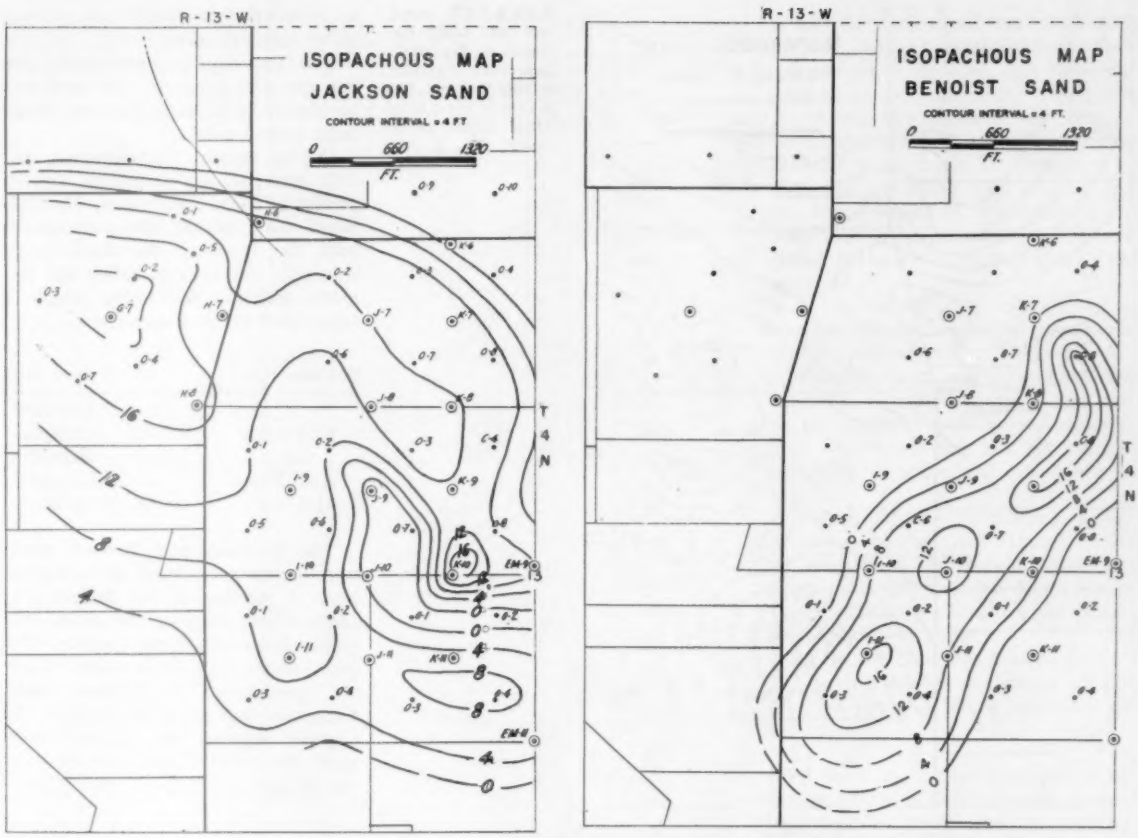
THERE'S A LOT of 50-year-old production in eastern Illinois. And there are a lot of water floods, too. This map of a portion of the state shows some of today's active water floods. Fig. 1.

How to get a million dollars from an abandoned oil lease

BY K. DAVISON
Executive Vice President,
AND R. L. SHICK
Vice President, Tekoil Corp.,
Oklahoma City, Okla.



OIL PRODUCTION, indicated by black dots, has been obtained in more than one pay in most eastern Illinois fields. Fig. 2.



THE JACKSON SAND and the Benoist sand were not detectable as individual producing horizons from old drillers' logs of wells in the Gray area. Later drilling and use of modern logging methods showed these sands to be separate pay zones. Figs. 3 and 4.

STARTING with a field in Lawrence County, Illinois, that had produced nearly 40 years, Tekoil Corp. started water flooding in three different formations to produce more than a third of a million barrels of secondary-recovery oil—and in only 7 years, too.

This water-flooding project is unusual in three respects: (1) The area was completely abandoned after nearly 40 years of production, (2) all of the production and injection wells were fracture-treated using an unusual method, and (3) at least three different formations are being flooded simultaneously without separation of oil production and only partial separation of injection water.

History . . . Oil production in eastern Illinois began in 1905 with the discovery of oil near Casey in Westfield pool of Clark County. During the next decade some 25,000 wells were drilled in an area trending for a distance of about 70 miles along the eastern border of Illinois. (Fig. 1).

It was rare when only one producing pay was found in a pool. Most of the pays in the "old" fields are Mississippian, while the Pennsylvanian sands are predominant to the north, Fig. 2.

Production in Lawrence County began in 1907 at the southern end of the trend. Production continued for 40 years and the leases of interest were abandoned.

Davison & Co., predecessor to Tekoil Corp., started operations on the Gray lease early in 1952. Reserves developed in the Gray area, which took its name from the original five-spot pilot, made up the major part of the capital when Tekoil Corp. was organized in March 1955.

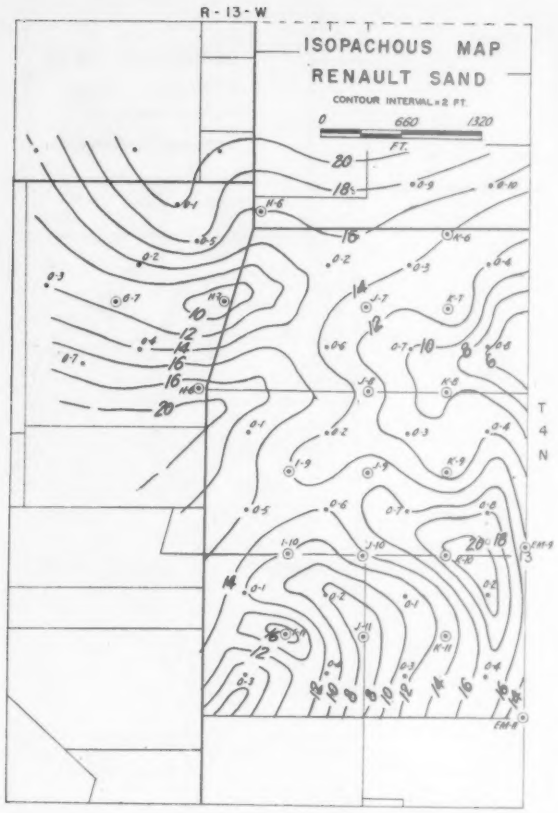
Tekoil has produced in the Gray area 338,965 bbl. of secondary oil to November 1, 1959. Production peaked at 16,054 bbl. per month. A secondary recovery of 276,603 bbl. has been produced to November 1, 1959, from leases which had an estimated primary recovery of 474,922 bbl. In 7 years, 58% as much oil has been recovered by secondary-recovery processes as was recovered by 40 years of primary history—40% has been recovered in the past 2 years. All oil recovered after the start of the project is termed secondary oil, although it has been shown that due to incomplete coverage and poor completion practices the area was not depleted during its length period of primary history, Table 1.

These results point up the fact that even though a property has been plugged and abandoned, it can still

TABLE 1—PRODUCING HISTORY

Lease	Acres	First Production	Production Primary	Production Secondary*	Recoveries, B/Acre Primary	Recoveries, B/Acre Secondary
Gray	80	1909	207,741	152,291	2,597	1,904
Martin	40	1908	†137,256	33,946	3,431	849
Applegate	§40	1908	‡	59,126	....	1,478
Porter	97	1908	129,925	90,366	1,340	932
Klingler	20	1908	38,485	3,236	1,924	51
Klingler	§43	....	‡	3,236	....	....
Total or Average	237	....	513,407	338,965	2,166	1,430

*Secondary production to 11-1-59. ‡Part of larger leases and production was not segregated. †Estimated. §Not shown in totals.



RENAULT sand, not as well defined as the Jackson and Benoist, is known as the Aux Vases in other areas of Illinois. Fig. 5.

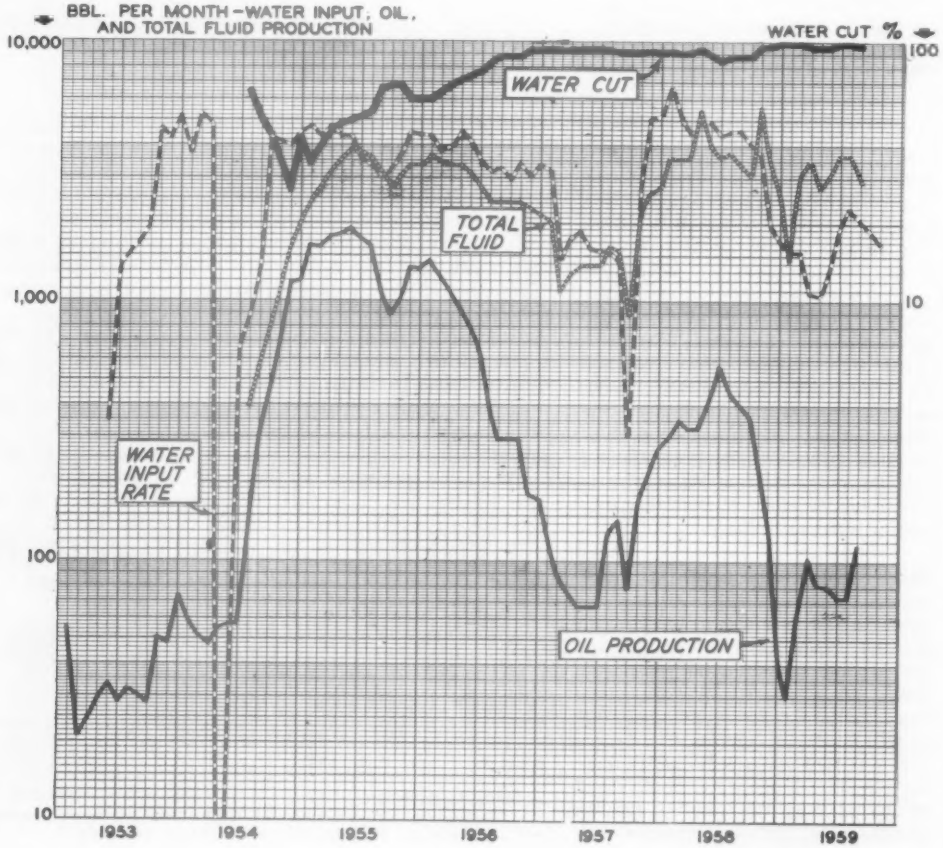
be economical to redrill and recover oil by water flooding.

The Gray lease had produced 5,000 bbl. per acre primary, and there was no history of water production. Prospects looked good.

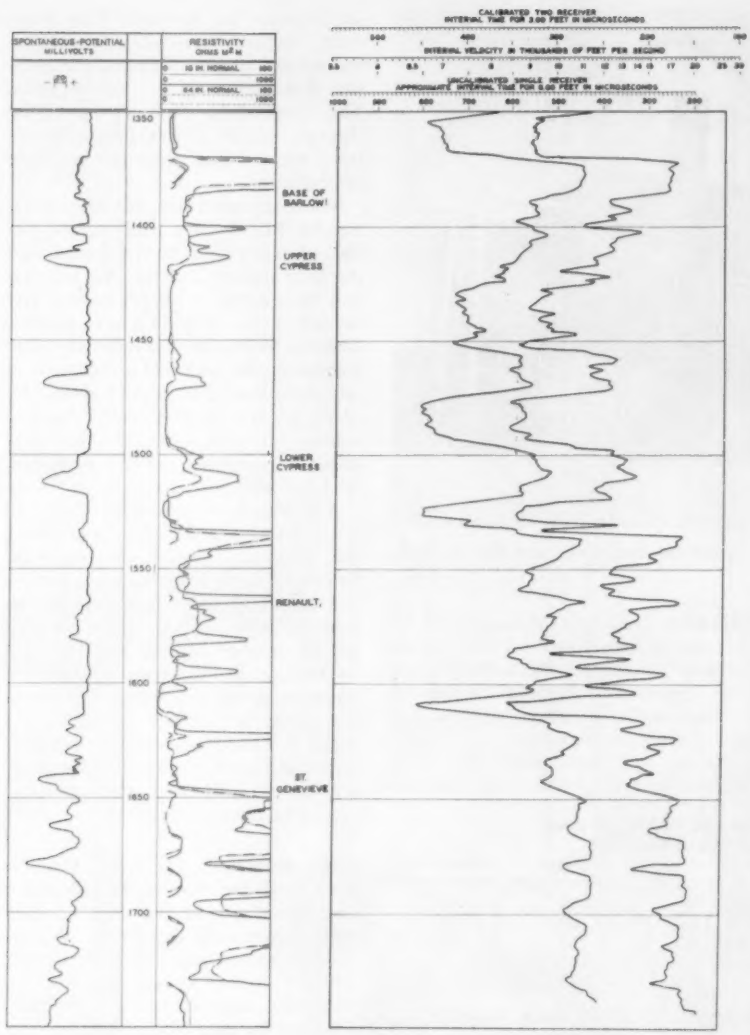
During original development, the only reference on cable-tool logs of producing formations was of the Kirkwood sand, which now corresponds with the Cypress; the Aux Vases, which in this area is called the Renault; and the McClosky, which is here called the St. Genevieve.

Old name	Present name
.....	Jackson
Kirkwood	Cypress
.....	Benoist
Aux Vases	Renault
McClosky	St. Genevieve

The Jackson and Benoist sands were never mentioned in cable-tool logs. A number of old drillers' logs are available showing the casing program, shows of oil, total depth, IP's, etc., but no mention is made of any well producing from these sands. Cable-tool logs listed the Jackson and Cypress together as the Kirkwood sand. No mention was ever made of the Benoist sand. Later drilling and



PRODUCTION history of the Gray O-6 well. Injection volumes have all been divided by 4 to get the estimated injection rate in the five-spot. Fig. 7.



TYPICAL ELECTRIC log and velocity log of the Gray area. These logs are from the same well. Fig. 6.

All the formations are of Mississippian age and although four sands are present in the area, only three are present in any one well. The maps show that the Jackson and Benoist formations are well defined, while the Renault is not. The St. Genevieve is the only producing lime present and on Tekoil leases is characterized by very thin zones of porosity. Where tested, it has shown mostly water with some oil.

A summary of the results of core analysis and the maximum permeability to air are shown in Table 2.

Recently, with the advent of the sonic-type log, several have been run for comparison with normal electric logs. A velocity log and an electric log from the same well are shown in Fig. 6.

The oil produced in this area varies in color, gravity, and viscosity. No oil samples of the Benoist alone are available at this time but Renault and Jackson oil have viscosities and gravities as shown in Table 3.

At bottom-hole temperature of 85° F., Jackson oil has a viscosity of 5.2 cp. and Renault oil a viscosity of 4.2 cp.

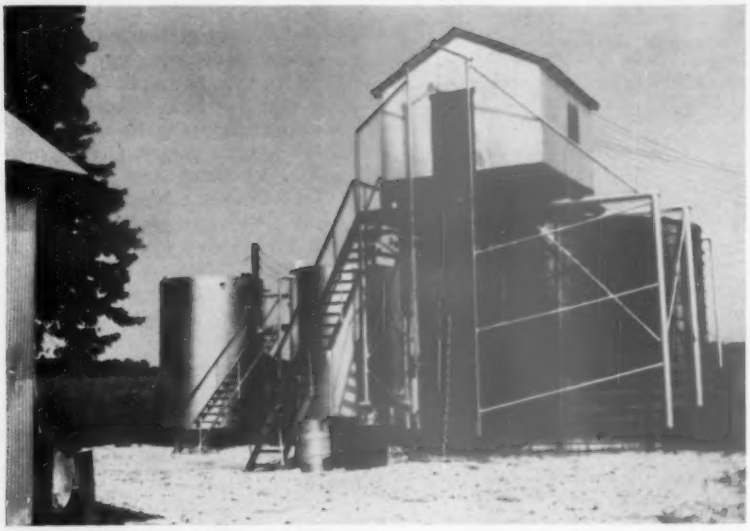
Pilot flood . . . The development of the pilot flood in the Gray area started in November 1952 with the drilling of oil well Gray O-6 and completed in July 1953 with the drilling of injection well Gray J-10. The initial pilot included injection wells I-9, I-10, J-9, J-10, and oil wells Gray O-6 and Martin O-2. These wells were drilled with rotary tools to total depth and casing was set on top of the Benoist sand.

The Benoist and Renault formations were then completed in open hole and

use of modern logging tools, including core analysis, confirmed the Benoist as a producing formation. The initial study, however, depended entirely on the cable-tool drillers' logs.

All five producing formations shown under their present names in the table above are now producing in the waterflood area. The first four formations, all sands, are producing on Tekoil properties, and the St. Genevieve is producing on the east offset lease. The St. Genevieve has been logged in a number of wells under Tekoil property. However, it is believed to be structurally unsuitable for oil production. Two line wells, EM-9 and EM-11, are injection wells in the St. Genevieve. The isopachous maps of the Jackson, Benoist, and Renault formations are shown as Figs. 3, 4, and 5.

SETTLING TANKS in the water-treating system. Fig. 8.



CHEMICAL TREATING HOUSE, the 500-bbl. wood treating tank, and the two 210-bbl. clear-water tanks. Fig. 9.

the Jackson sand completed by perforating the casing. After pipe was set, cable tools were used to drill the plug and clean out the well to total depth. The Benoist and Renault formations were shot with an average of 15 qt. of nitroglycerin opposite each sand section. After cleaning out, injection wells were completed by running cement-lined tubing with packers to separate the Jackson from the Benoist and Renault formations. On oil wells, all zones were left to produce simultaneously.

In one well in the initial pilot, I-10, a 10-ft. section of Securaloy pipe was set opposite the Jackson. This Securaloy section was subsequently removed with caustic soda and the Jackson shot with 9 qt. of nitroglycerin. This resulted in damaged casing through which it was impossible to run a packer. This procedure was then discontinued.

Water injection began in May 1953, and by July 1954 a total of 141,848 bbl. of water had been injected into the four injection wells. No increase had been noted in oil production and in July 1954 Gray O-6 was given a fracture treatment. Immediately after fracturing, the well had an increase in oil production, and peaked at 61 bbl. of oil per day in May 1955. To November 1, 1959, Gray O-6 has produced an estimated 35,655 gross bbl. or 3,565 bbl. per acre.

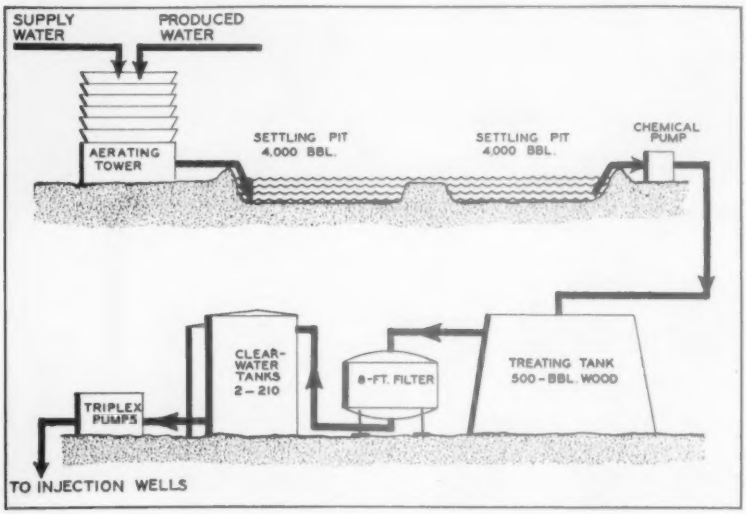
The history of the Gray O-6 well is shown as Fig. 7. The curve shows the gross oil production estimated from well tests, total fluid production, and the total water injection of the four surrounding injection wells. Injection volumes have all been divided by four to get the estimated rate of injection in the five-spot. The water-cut curve is the last curve shown. There is a close similarity between the injection curve and the fluid-production curve, with fluid production being almost proportional to injection.

TABLE 2—WEIGHTED AVERAGE POROSITY AND PERMEABILITY OF CORES ANALYZED

	Feet analyzed	Perosity %	Average permeability md.	Maximum permeability md.
Jackson	21	18.3	65	172
Upper Cypress	16	17.3	23	90
Benoist	27	11.5	8	11
Renault	72	14.8	31	472

TABLE 3—PROPERTIES OF OIL PRODUCED IN THE GRAY AREA, ILLINOIS

		API Grav.	Viscosity, Cp.			
Oil formation	Color	at 60° F.	60	90	120	150
Jackson	Black	35.8	9.07	4.94	3.75	2.75
Renault	Green	36.8	5.8	3.9	2.7	2.0

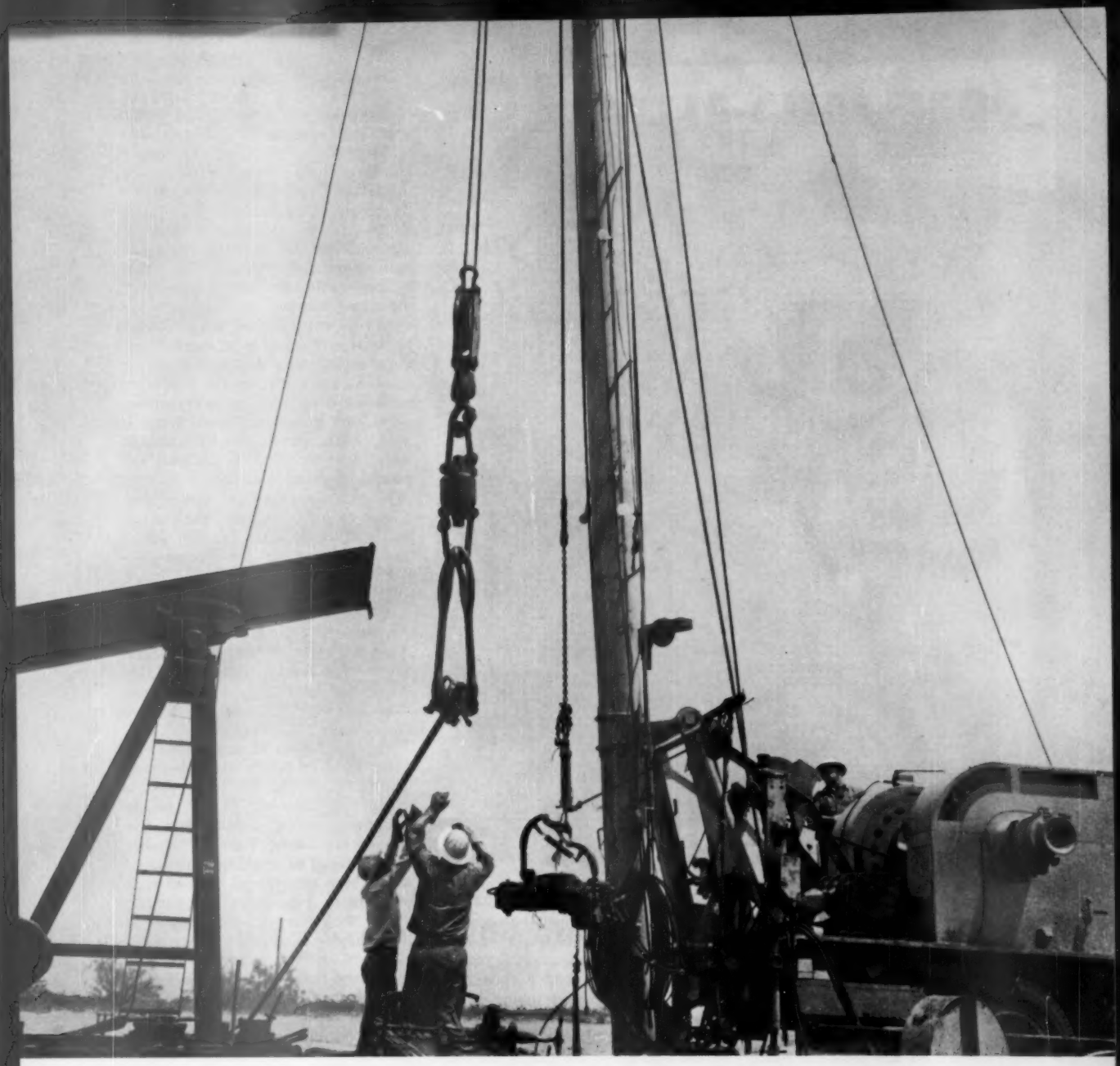


FLOW DIAGRAM of the water-treating system. Fig. 10.

Field electrified . . . At the time the pilot flood was commenced, there was insufficient gas in the area to operate the necessary equipment. As operations were expanded, a three-phase 440-volt electric system was installed field-wide, and all facilities are now operated by electricity.

Actual operations have been reduced to a routine so that two pumpers do all the necessary work other than technical services such as repair of electrical equipment. Water supply is obtained from two wells completed in the Bridgeport sand at approximately 1,100 ft. Each well is equipped with a Reda pump to lift the water to the surface. All water, both supply and produced, enters two settling pits of 4,000-bbl. capacity each, Fig. 8. The water enters one corner of the pit over an aerating tower containing coke.

After the necessary retention time in the first pit, the water enters the second settling basin over a concrete spillway. Water is picked up by a centrifugal pump out of the second pit and pumped through the treating house located on top of the water-settling tank, Fig. 9. The house originally contained two dry-chemical feeders, lime and alum. This method of treatment has now been discontinued. As the water enters a flume in the



Work-over Job in the McElroy Field . . . with Bethlehem Wire Rope. This photograph, taken early in 1959, shows a work-over job on a dual completion well in the McElroy Field, near Crane, Texas, which was handled by Well Servicing Company of Crane. The well ranged in depth from 9,000 to 12,000 ft. The Bethlehem wire ropes used in this assignment were 12,000 ft of 9/16-in. 6 x 7 Formset mild plow, right lay, with solid plastic core, and 500 ft of 7/8-in. 18 x 7 Formset Purple Strand, Non-Rotating. In addition, ½-in. 6 x 31 Formset Purple Strand, right lay, with IWRC, was used for the guy lines. Always dependable, top-quality Bethlehem rope is an old favorite on servicing units.

Bethlehem Steel Company, Bethlehem, Pa. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem Wire Rope.

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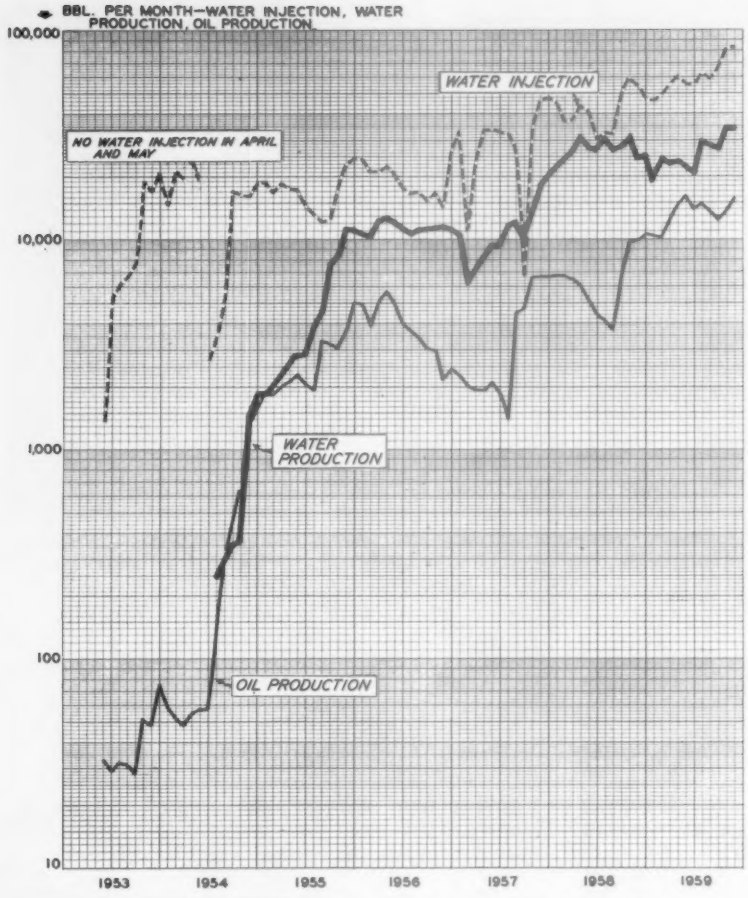
BETHLEHEM WIRE ROPE

BETHLEHEM STEEL



PRODUCTION HISTORY of the total area under flood. Fig. 11.

center of the tank, a liquid coagulant is added to help settle the solid particles in the water.

The settled water is pumped through an 8-ft. pressure-type filter containing coal. After filtering, the water goes into two 210-bbl. clear-water tanks (Fig. 9). At this point the water is again picked up by centrifugal pump which charges the suction of the two triplex pumps presently in the water station. Water is discharged at approximately 700 psig. to all injection wells in the field (Fig. 10).

Produced water from the Gray, Martin, and Applegate leases flows by gravity into a pit where it is picked up by a pump and pumped over the aerating tower in pit 1.

All water lines in the field are either low-pressure plastic pipe or cement-lined steel pipe. All low-pressure lines from the Reda pumps into the plant and from the pit handling produced water into the plant are low pressure plastic lines. The water is distributed to the field through 3-in. cement-coated steel lines with some individual wells having 2-in. injection lines. Each injection well is equipped with cement-lined tubing to minimize corrosion of the equipment. Where wells are dually completed for injection purposes, internally cement-coated tubing is run with a packer. No protection is thus afforded to the exterior of the tubing or the interior of the casing on dual-injection wells.

Since the area was expanded, completion procedures have changed due to the improvement in technique. Here, an unusual method of fracturing is used. On all wells, both producing and injection, 4½-in. casing is run through all pay sections and all completions are therefore perforation and fracture-type completions with no packers being used. All completions begin by treating the lowermost pay. A gamma-ray log is first run for correlation with the electric log. The lower interval is then perforated with approximately 30 holes with the number of shots per foot depending on the interval perforated. The well is then fractured down the casing at a rate sufficient to have approximately 1 bbl. fluid per minute through each of the casing perforations. Just before complete displacement of all sand into the formation, pumping is stopped and the sand is allowed to screen out in the casing. If it is determined that there is insufficient sand in the casing to cover the perforations, sand is dumped into the well to cover the perforations. The next-higher zone is then perforated and fractured in the same manner. If necessary, the third zone is perforated and fractured. No differentiation is made between the completion of an injection and an oil well except that on the producing wells, oil is used as the sand-carrying agent, and in injection wells water is used. Each zone is usually fractured with 3,000 to 5,000 lb. of sand, depending on sand thickness.

If it is necessary to rework producing or injection wells, the fracturing is normally done through tubing and packer. In this case, a retrievable-type bridging plug is set just below the formation to be fractured. A small amount of sand is dumped on the plug. The top packer is set at a point just above the pay section. This pay is then fractured down the tubing. After fracturing, sand is circulated off the plug and the plug is removed.

The production history of the area under flood by this company is shown graphically as Fig. 11. The peaks in production represent periods of development. Most development usually occurs during June to October.

As a result of working in this area, it has been determined that 40 years of primary production has not depleted the reservoir. Four wells on the Klingler lease each produced in excess of 100 bbl. per day at the time they were redrilled during September and October and completed by fracture treatment. Perforation and fracture-type treatments have given by far the best results, particularly where the zones such as the Benoist and the Renault are separated by 15 to 20 ft. of lime and shale. There have been no cavings and no damaged pipe outside of the original five-spot development. It has been possible to flood simultaneously four producing pays. Flood performance could be improved if all the old cable-tool holes had been redrilled and plugged. The sonic log in this area does not seem to offer any more information than coring and electrical logging except possibly being more economical. A considerable amount of plugging in the injection wells was experienced until settling pits were installed and treatment was started on the injection water. Since that time, there has been essentially no plugging, and injection rates have remained very good.

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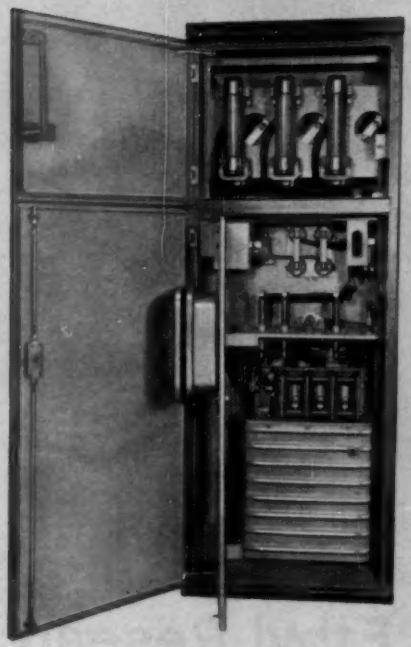

NEW oil-immersed line gives you broadest choice yet in high voltage control

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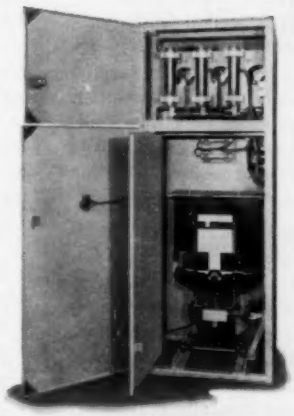

400-ampere air-break contactor available in Type H front access controllers for non-hazardous indoor and outdoor service.

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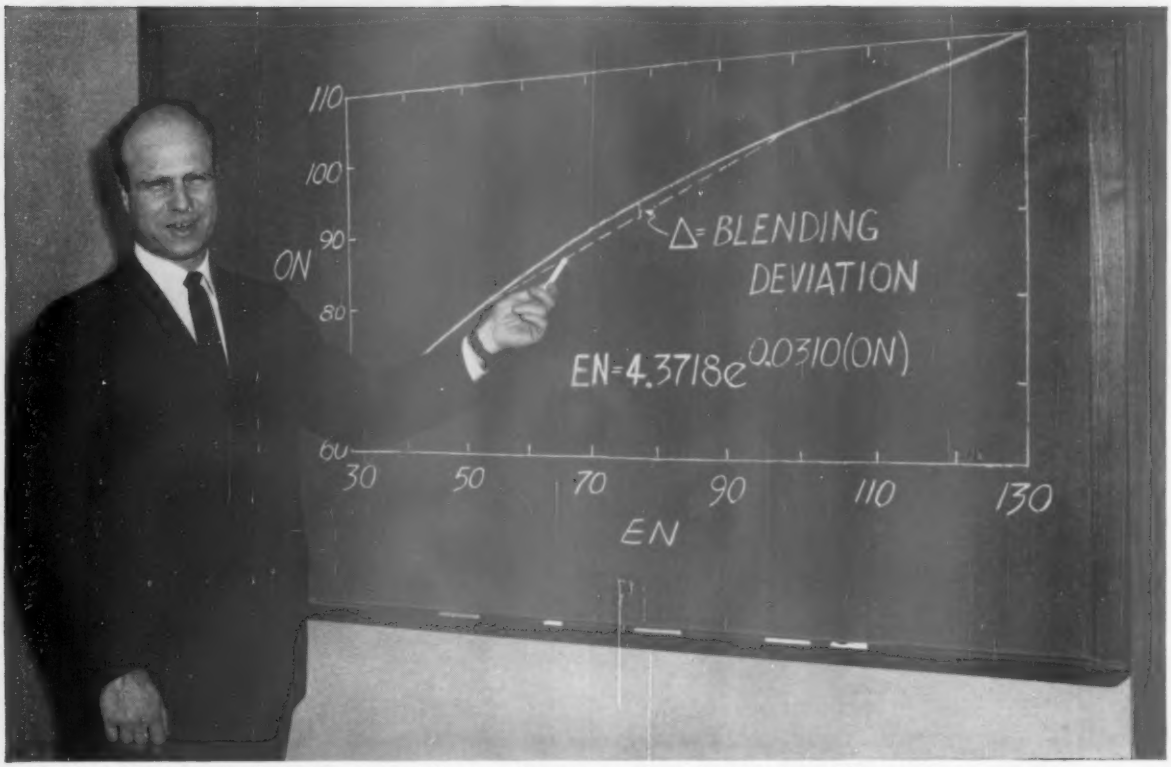


Dr. W. C. Healy, Jr., who devised the new scale for averaging octane numbers, demonstrates an EN conversion curve.

Ethyl Research develops new Octane Blending Scale

FOR MANY YEARS, refiners have been plagued by the fact that octane numbers do not blend by volume. The volumetric average of component octane numbers is usually higher or lower than the octane number of the corresponding blend of the components. This is commonly referred to as a blending bonus (or deficit).

Numerous schemes have been developed to calculate octane quality of finished blends. Unfortunately, few methods have universal application or a simple mathematical approach to solution.

A further disadvantage exists since many of the current blending computation schemes are basically non-linear, and thus h ve only indirect application in linear programming problems.

New Scale Based on Exponential Function

It has been observed in a review of countless gasoline blending studies that blending bonus (or deficit) tends to vary with the octane differences of the components. To be more specific, in multicomponent refinery blends, the blending bonus is often almost proportional to the average squared octane difference between components. As a result of the discovery of this relationship, the EN scale was developed.

The scale has the following form:

$$EN = a + be^{2k(ON)}$$

where:

EN = converted octane number

a = arbitrary constant

b = arbitrary constant

e = natural logarithm base

k = exponential constant determined for each refinery application.

ON = octane number.

A curve showing this relationship for a specific refinery is demonstrated in the illustration above.

How to Determine the Exponential Constant "k"

The exponential constant k may be determined very simply for a particular refinery from a group of typical gasoline blends. *Blending deviation* (observed blend octane number minus volumetric average of component octane numbers) plotted versus the *volumetric average of the squared component octane numbers minus the square of the volumetric-average octane number* $\left[\overline{ON^2} - (\overline{ON})^2\right]$. The numerical value of k is the slope of a line through the plotted points and the origin. In order that different TEL levels be represented in determining k, the plot should encompass a range—say 0.5 and 3.0 ml/gal.

To completely define the new blending scale, values must be assigned to "a" and "b". The choice is completely arbitrary and is governed by convenience. For example, values may be chosen

so EN is equal to 100 when ON equals 100; or the EN scale may be made to match the ON scale at two points, for example 80 and 100. It is usual for b to have the same sign as k so that ENs increase when ONs increase.

How Accurate is the Scale?

In order to check the accuracy of the scale and illustrate its efficiency, standard errors are compared for four systems of determining final blend octanes.

1. Volumetric average of *component ONs.*
2. *Octane blending values* by least squares method and volumetric average of values so determined.
3. Volumetric average of *component ENs* and conversion of this average to ON.
4. *EN blending values* by least squares method, volumetric average of values so determined, and conversion of this average to ON.

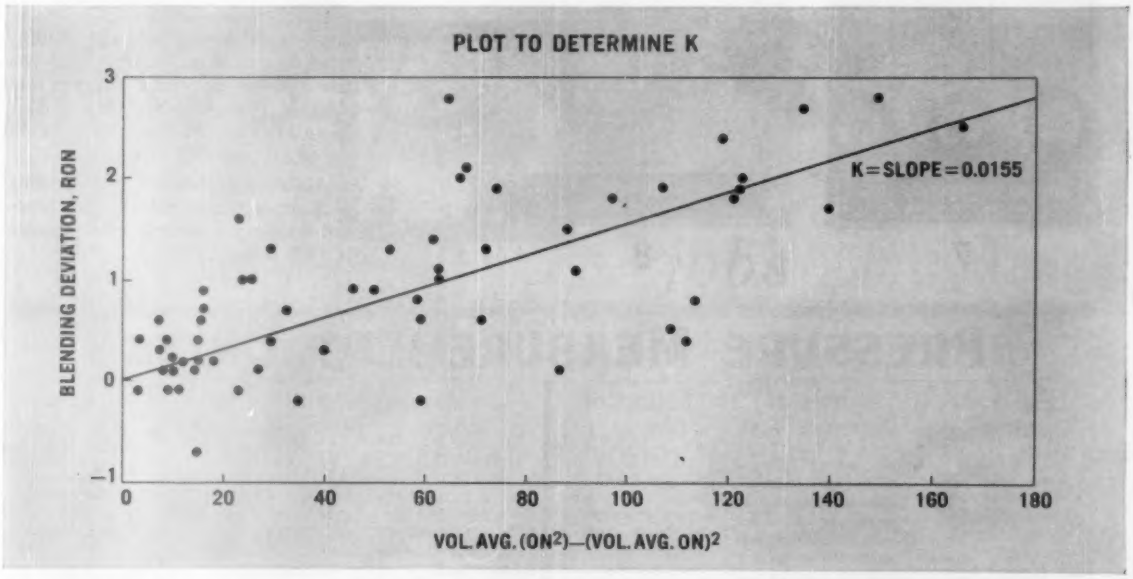
The table shows a comparison of standard error in RON for the four systems using 30 blends of 11 components. It is interesting to note that simply using component ENs compares in accuracy with the volumetric average using octane blending values by least squares. Accuracy is significantly improved when EN blending values determined by least squares are averaged volumetrically.

SUMMARY

Octane blending may be linearized by changing octane numbers to ENs using Ethyl's exponential scale. The method is equally usable with Research and Motor octanes and accuracy is improved over other known systems. It is directly applicable in linear programming.

COMPARISON OF STANDARD ERROR, RON

	Predicting Method			
TEL, ml/gal	Component ON	Octane Blending Values	Component EN	EN Blending Values
0.5	1.63	0.71	0.63	0.43
3.0	0.87	0.56	0.53	0.44



How Ethyl Research can help you

Mathematical Analysts in Ethyl's Refinery Technology Division will be glad to show you how the EN scale can be applied to your gasoline blending.

For an appointment with one of these specialists, see your Ethyl Representative.

Your Ethyl Representative also can supply you with copies of the paper, "Two Approximation Problems in Linear Programming of Gasoline Blending," presented at the computer conference of the Western Petroleum Refiners Association held in Tulsa, Oklahoma last December.

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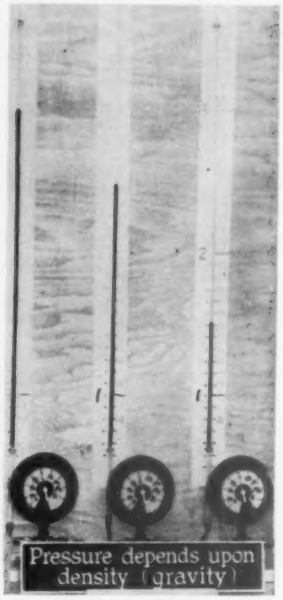
Pressure principles demonstrated



7

8

THREE DEMONSTRATIONS on this page complete the material on pressure principles, except for a quiz in the next installment.

7. Three different liquids—water, heating oil, and carbon tetrachloride—are placed in three tubes. Because each liquid has a different specific gravity, it will take different heights of liquid to exert the same pressure (specific gravity × height = pressure).

8. The same liquid is put into several differently shaped vessels. Pressure does not depend upon the amount of liquid in the vessel but only on the height of liquid above the point at which the pressure is measured.

9. Chart shows the most common pressure-measurement units and pressure-measuring devices. By reading from left to right on the chart you can convert one gage reading into another. For instance, 1 psig. = 27.7 in. of H_2O = 812 mm. of Hg. = 32 in. of Hg. = 15.7 psia.

Absolute pressure is gage reading plus atmospheric pressure. At standard conditions atmospheric pressure is 14.7 psia.

This material taken from process-training-program manual, Bayway, N. J., refinery of Esso Standard Oil Co.

PRESSURE MEASUREMENT UNITS

P.S.I.G. (Pounds per Square Inch Gage)	Inches of Mercury ("Hg)	Inches of Water ("H_2O)	Millimeters of Mercury (M.M. Hg)	Weather Bureau Inches Mercury (" Hg)	P.S.I.A. (Pounds per Square Inch Absolute)
99% of Refinery process gages read in P.S.I.G.	Most common Refinery method of measuring vacuum. "Combination" gages use P.S.I.G. for *more* than atmospheric pressure & "Hg for *less* than atmospheric pressure.	Used to measure pressures a little *more* or *less* than atmospheric. Furnace draft gages	Used for vacuum measurement (#5 & #6 Pipestills) and sometimes weather Bureau. (Absolute Scale)	Weather forecasts, barometers, etc. (Absolute Scale)	A few instruments may read in P.S.I.A. - Mostly used in Engineering calculations. (Absolute Scale)
200 P.S.I.G.	Not normally measured by inches Hg	"H_2O not used for large pressures	M.M. Hg not used for large pressures	"Hg not used for large pressures	214.7 P.S.I.A.
MORE THAN ATMOSPHERIC PRESSURE					
1 P.S.I.G.		+27.7 "H_2O	812 M.M.	32"	15.7 P.S.I.A.
0 P.S.I.G.	0"	0" H_2O	760 M.M.	30"	14.7 P.S.I.A.
	2"	-27.7 "H_2O	708 M.M.	28"	13.7 P.S.I.A.
VACUUM — LESS THAN ATMOSPHERIC PRESSURE					
Vacuum not measured in P.S.I.G.	28" 30" Hg	"H_2O not used to measure large vacuums	52 M.M. 0 M.M.	2" 0" Hg	1 P.S.I.A. 0 P.S.I.A.

9

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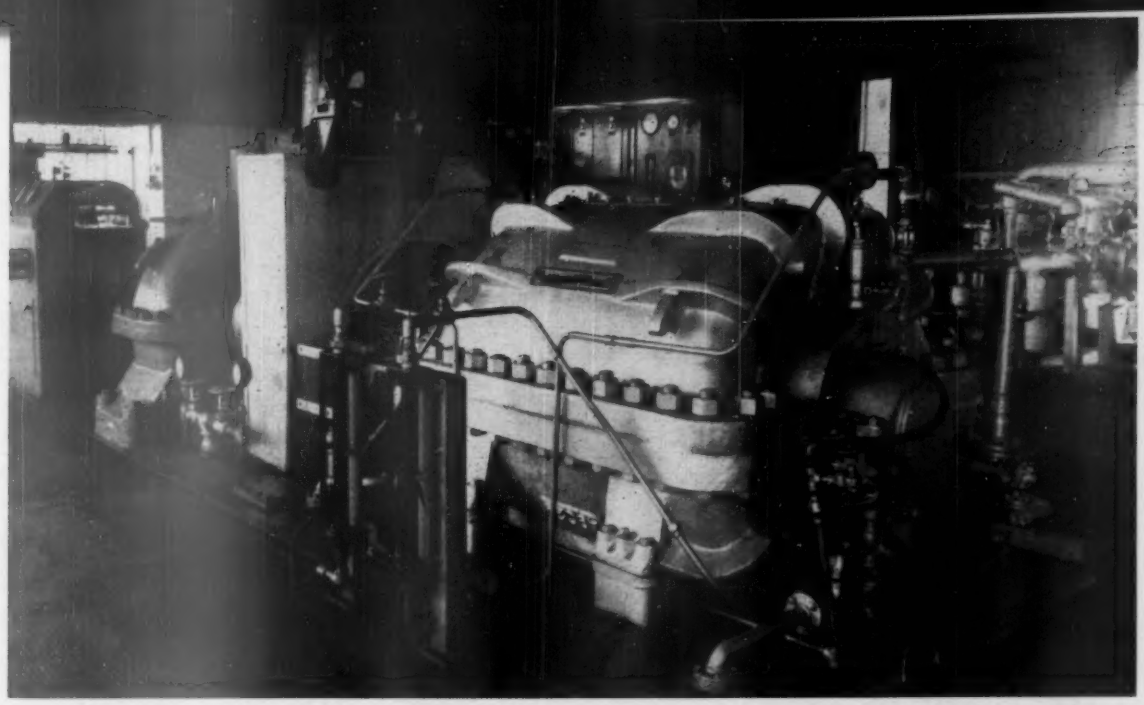


THIS CENTRIFUGAL COMPRESSOR is of the type that can be approximated by the procedure outlined in the article. It's "straight through," no cooling used, and impellers run at near optimum speed. Unit in gas service is rated at 12,900 c.f.m., 100 psig., and is driven by a steam turbine at 6,700 r.p.m.

Here's an easy approach to centrifugal-compressor selection

The method described here is based on five charts and graphs. Using the appropriate chart and simply plugging in pertinent data will result in an approximate answer ample for "first approximation" studies.

BY SHERMAN L. COLE
Engineer, Centrifugal Compressor Dept.
Ingersoll-Rand Co.

OFTEN engineers not intimately familiar with centrifugal compressors and their workings desire to approximate the type of machine required for a given compression job. Presently published data include information permitting calculation to a high degree of accuracy.

In many instances, however, the extra degree of perfection does not warrant the additional time that is necessarily spent in figuring out how to use this exact, but more complicated, approach. This is especially true for sales engineers, plant engineers, process engineers, and others not using the information and steps frequently in the ordinary course of daily work.

It is desirable that any method of providing a "first approximation" of a centrifugal compressor for a contemplated service not to have to introduce such factors as impeller polytropic efficiency, mechanical and thermodynamic losses, exponential calculations, and "Mu" or other "letter" factors. The purpose of this article is to provide such a solution.

Although the above factors are considered, the engineer is not burdened with having to introduce them correctly himself. They are buried in the curves so that the user need not worry about using them in the solution to the problem. This approach might be termed a thermodynamic one, oriented to consider present designs and technology levels existing in the centrifugal-compressor industry.

The data presented permit approximating:

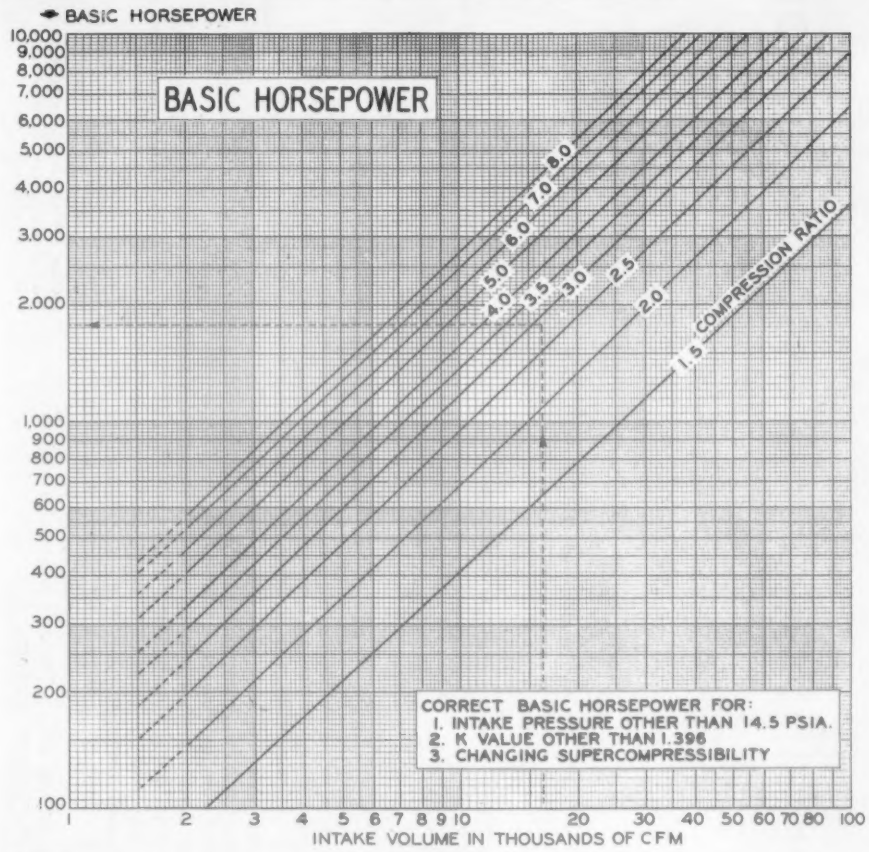
1. Compressor-shaft brake horsepower at coupling.
2. Number of stages.
3. Discharge temperature.
4. Speed.

The solution is valid for uncooled "straight-through" compressors only and with impellers running at near optimum design speeds.

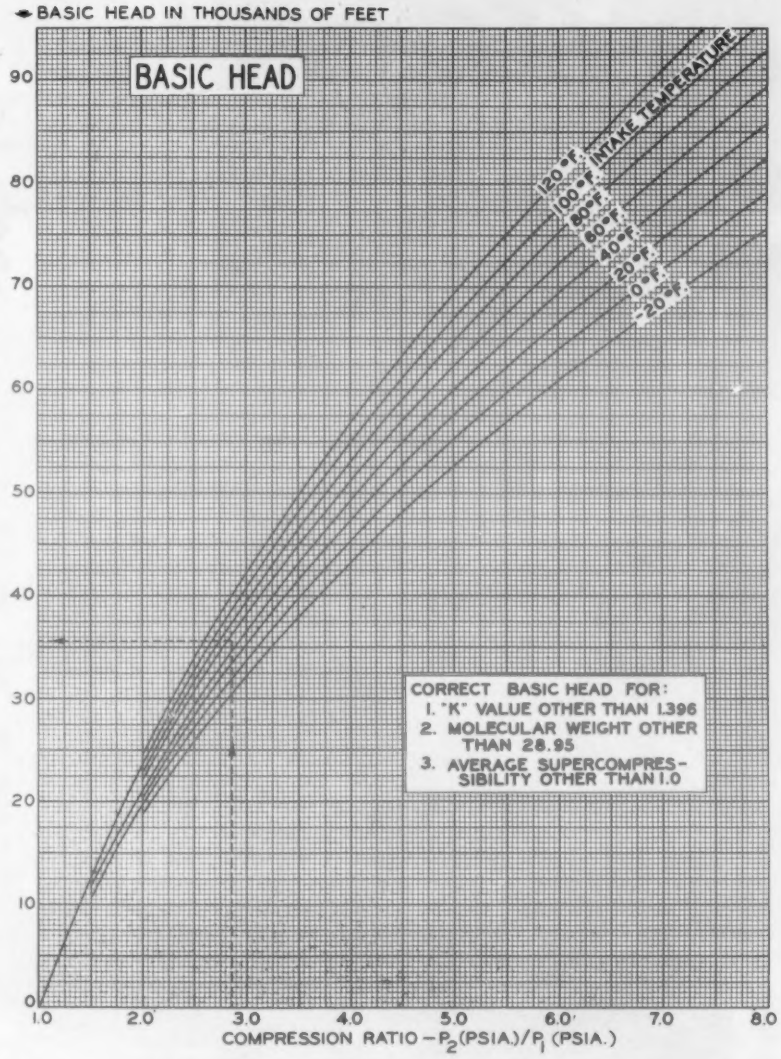
Before the solution is attempted, the following information should be available:

Intake pressure—psia.
Intake temperature—° F.
Intake volume—actual inhaled cu. ft. per minute at compressor flange.
Discharge pressure—psia.

CENTRIFUGAL COMPRESSOR SELECTION—Starts on Page 107



CURVE 1 gives basic horsepower for machine with intake of 14.5 psia., "K" value for air (1.396), and supercompressibility factors neglected.



CURVE 2 gives basic head for machine with "K" value for air (1.396), molecular weight for air (28.95), and supercompressibility factors neglected.

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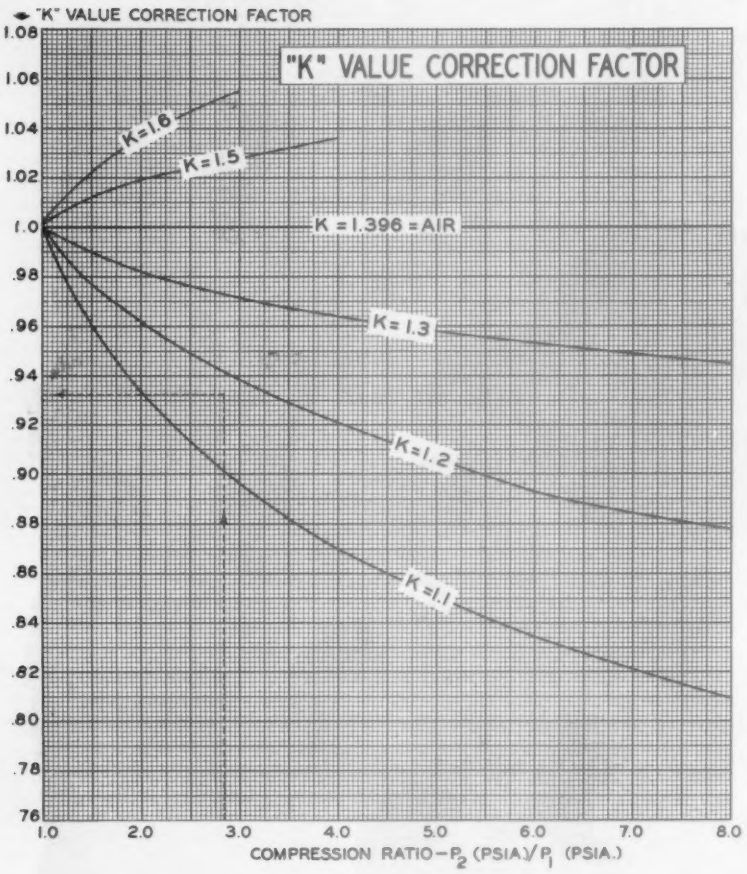


CURVE 3 gives "K" value correction factor if other than air.

"K" value (Cp/Cv) of gas—(if other than air).

Molecular weight of gas—(if other than air).

Supercompressibility of gas at intake (and discharge) conditions.*

Calculate: Compression ratio = Discharge pressure (psia.)/Intake pressure (psia.).

*Supercompressibility factors are optional for increased accuracy provided intake volume calculation has considered supercompressibility at intake conditions. The intake volume in every case must be actual cubic feet per minute at service intake conditions.

Proceeding as outlined directly below will provide an approximation of the information desired, permitting the engineer to determine about what "size" centrifugal compressor will be required to do his job. The answers are approximate—round them off!

Compressor Brake Horsepower

1. Read "basic horsepower" from Curve 1, for a machine operating with intake conditions of 14.5 psia., "K" value for air (1.396), and supercompressibility factors neglected.

2. Read "K"-value correction factor from Curve 3 (if other than air).

3. Brake horsepower at coupling equals: Basic hp. (step 1) × "K"-value correction factor (step 2) × actual intake pressure (psia.)/14.5.

For increased accuracy, multiply above by ratio of average supercompressibility for intake and discharge conditions to supercompressibility at intake conditions.

Number of Stages

1. Read "basic head" from curve 2, for a machine operating with "K" value for air (1.396), molecular weight for air (28.95) and supercompressibility factors neglected.

2. Read "K"-value correction factor from Curve 3 (if other than air).

3. Determine polytropic head equals: Basic head (step 1) × "K"-value correction factor (step 2) × 28.95/molecular weight.

For increased accuracy, multiply above value by average of supercompressibility for intake and discharge conditions.

4. Number of stages equals: Polytropic head (step 3)/9500.

Discharge Temperature

1. Read "temperature-rise multiplier" from Curve 4.

2. Multiply temperature rise multiplier (step 1) times intake temperature absolute (°F. plus 460) to obtain "temperature rise."

3. Discharge temperature (° F.) is equal to: Intake temperature (° F.) plus temperature rise (step 2).

Compressor Speed

Read compressor speed, in r.p.m., from Curve 5.

Example: Assume that a compressor is desired which can handle gas with characteristics and to operate at conditions as follows:

Intake pressure	16.8 psia.
Intake temperature	50° F.
Quantity of gas handled	131,500 lb. per hour
Discharge pressure	48.1 psia.
"K" value of gas	1.18
Molecular weight of gas	42.7
Supercompressibility of gas at intake conditions	.98

The first step in the solution is to determine the actual intake volume in cubic feet per minute. Substituting in the formula PV = WRT, intake volume calculates to be 16,350 c.f.m. as follows:

$$\frac{131{,}500}{60} \times \frac{1{,}544}{42.7} \times 510 \times 0.98 = 144 \times 16.8 \times V_1$$

Intake volume (V_1) = 16,350 c.f.m.

Calculation of compression ratio from 48.-/16.8 yields 2.86.

Compressor Brake Horsepower

1. Basic horsepower from Curve 1 = 1,770.

2. "K"-value correction factor from Curve 3 = 0.932.

3. Brake horsepower at coupling equals: 1,770 × 0.932 × 16.8/14.5 = 1,910 hp.

Number of Stages

1. Basic head from Curve 2 = 35,500.

2. "K"-value correction factor = 0.932.

3. Polytropic head equals: 35,500 × 0.932 × 28.95/42.7 × 0.98 = 22,400 ft. (assuming supercompressibility at discharge conditions the same as at intake conditions).

4. Number of stages equals: 22,400/9,500 = 2.36 (3 stages required).

Discharge Temperature

1. Temperature-rise multiplier from Curve 4 = 0.25.

2. Temperature rise equals: 0.25 × 510 (460 plus 50° F.) = 127.5 (say 125°).

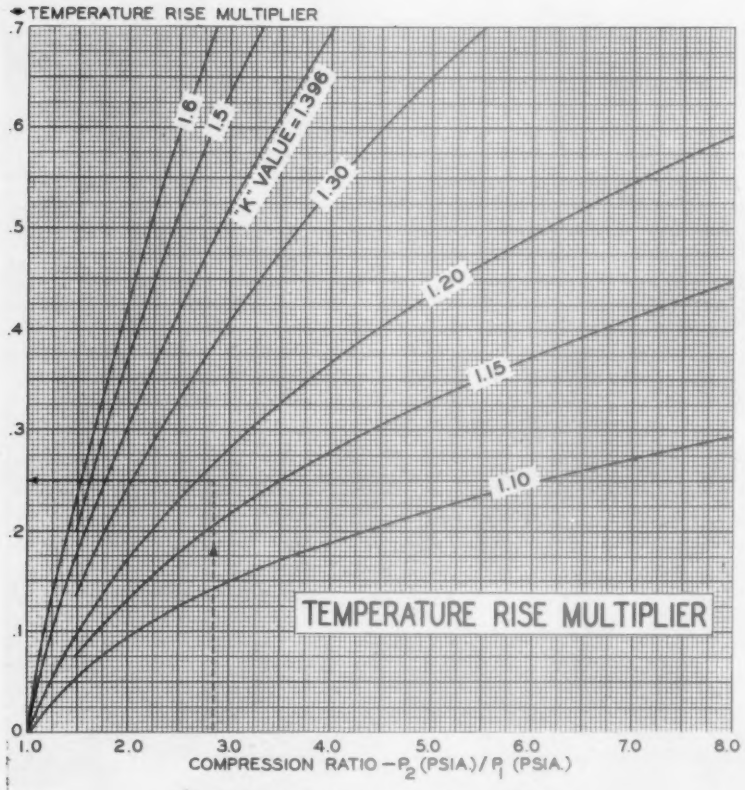
3. Discharge temperature equals 50° F. plus 125° rise = 175° F.

Provided the value was not stated originally, it is now possible to determine the supercompressibility factor for the gas at discharge conditions by using sources available for this purpose. If it differs substantially from the "intake" value, it will change the horsepower and polytropic head pre-

LIBYA

Dynamite for shot-firing being carried across country by camel train. BP Exploration Company (Libya) Limited is now searching for oil over six concession areas in Tripolitania, Cyrenaica and the Fezzan.

BP



CURVE 4 gives temperature-rise multiplier.

viously calculated. These values can be revised accordingly by taking into account average supercompressibility as provided for in the instruction procedure.

Compressor Speed

1. Read compressor speed from Curve 5 as approximately 6,500 r.p.m.

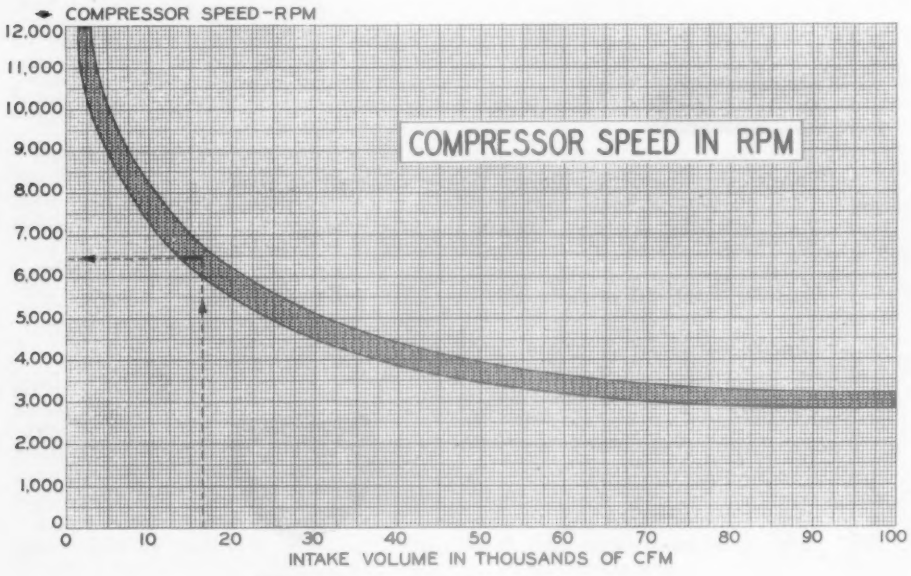
It will be obvious to the reader that the approximations presented herein are valid for the design-point operating condition only. This procedure should not be used to calculate performance at so-called force-fit conditions, which are possible operating points of a compressor that is designed to run under other circumstances. Use of the curves in this article for such purposes will normally result in substantial error, since they are drawn on the basis of an infinite number of design points. Off-design conditions must consider characteristics of this compressor which are beyond the scope of this presentation.

It is not the intention of this article to imply that there are no machines in the centrifugal-compressor industry that can develop heads in excess of the 9,500 ft. per stage used here. The writer's own company has stage designs that under certain conditions can develop several times this value. Other manufacturers also have developed high-head machines. However, these are ultrahigh-speed units designed for specialized services and conditions. Most heavy-duty industrial centrifugal compressors still fall in the 9,000 to 10,000-ft. per stage range, with lower-capacity stages developing slightly less.

As pointed out previously, the solution presented is approximate for single casing, uncooled centrifugal compressors with "straight-through" compression. That is, no introduction or removal of gas takes place between the stages. Also, it assumes that impellers are running at near optimum design speed.

If it is necessay to run at reduced speed because of low sonic gas velocities at operating conditions, special impeller materials of low strength, or tandem drive with a slower-speed centrifugal, the "number of stages" solution will be inaccurate. The horsepower and discharge temperature would still be a reasonable approximation, however.

If the solution results in discharge temperatures in excess of 450° F. or if discharge volumes are approaching 500 c.f.m. or any of the limitations in the previous paragraph apply, the problem should, even in preliminary investigative stages, be referred to centrifugal-compressor manufacturers for a more complete analysis of all factors. Only in this way can proper guidance be furnished in solving the compression problem.



CURVE 5 gives compressor speed in r.p.m.

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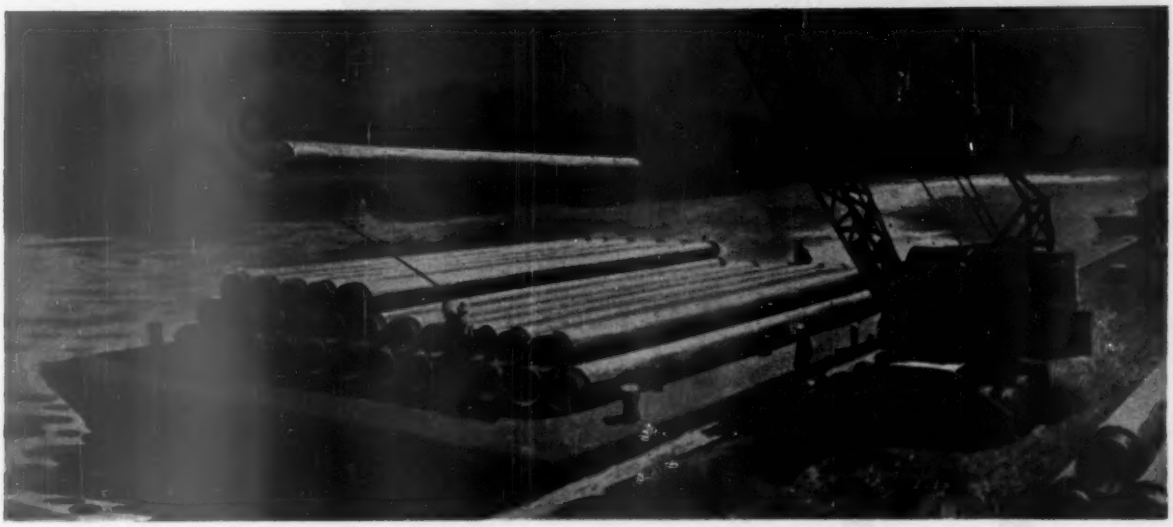
Take storage, for example. Two Price Co. plants, one in Philadelphia, one in Harvey, La., offer storage area for over 200 *miles* of coated pipe. Look at transportation. Low cost barge shipment to and from the Harvey plant means substantial savings. Economical rail shipment directly to and from the Philadelphia plant, coupled with truck delivery of coated pipe, with plant site storage, lowers coating costs, gives the contractor the pipe on-time, on-the-job.



And finally, look at coating material choice. EXAMPLE: Where moderate weight is needed, together with positive protection against corrosion and electrolytic action, SOMASTIC® coating can provide *protection* and *displaced weight* in one operation, at important savings on every foot.

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Two teeth with same number of hours on same machine. At left, sharpness is retained with STOODY 100; at right, edge of unprotected tooth is blunted.

1 *Line up several teeth against a tilted carbon block. Cutting edges should be approximately level and teeth closely butted.*

Dull teeth and frequent changes take the profit out of ditching operations. The answer—hard-face teeth before they are installed and repeat the hard-facing as they wear.

2 *Now make a continuous pass of STOODY 100 applied semi-automatically along cutting edge, tieing all teeth together. Second pass of STOODY 100 is molded to sharp edge by carbon block beneath. Dropping teeth flat on concrete floor breaks them apart. This welding technique saves time, keeps sides square without individual welding attention. Same system can be used with standard Stoody manual electrodes.*

A Texas contractor follows this plan, uses the semi-automatic welder applying STOODY 100 to keep teeth sharp longer and reduce time out for changes. The photos show how it's done. *This contractor has found that teeth protected with STOODY 100 working in limestone and shale are good for better than 150 hours,* while unprotected teeth are worn to destruction in 30 hours with several sharpenings necessary in-between.

Many operators of ditching equipment operating in extremely abrasive soils find that one or two passes of STOODY TUBE BORIUM, a tungsten carbide material, on tooth points give an amazing increase in service life—outlasting all ordinary alloys.

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Electronic instrumentation finds favor at Anchor's Tabasco plant

Advantages: Signal-lag problem eliminated, and sensitivities are infinite

BY HARRY R. MARSH
Marsh Co.

ELECTRONIC instrumentation has provided very satisfactory control in Anchor Gasoline Corp.'s Tabasco plant. It offers centralized control from one location thereby requiring only one operator per shift. Plant operation has been much smoother in general, and startups and shutdowns much faster.

Other advantages were also gained from electronic equipment:

- No moving parts.
- Interchangeability of components.
- Simple operation and maintenance.
- Comparable costs with pneumatic equipment.
- Better adaptation to future improvements in instrumentation and computer control.

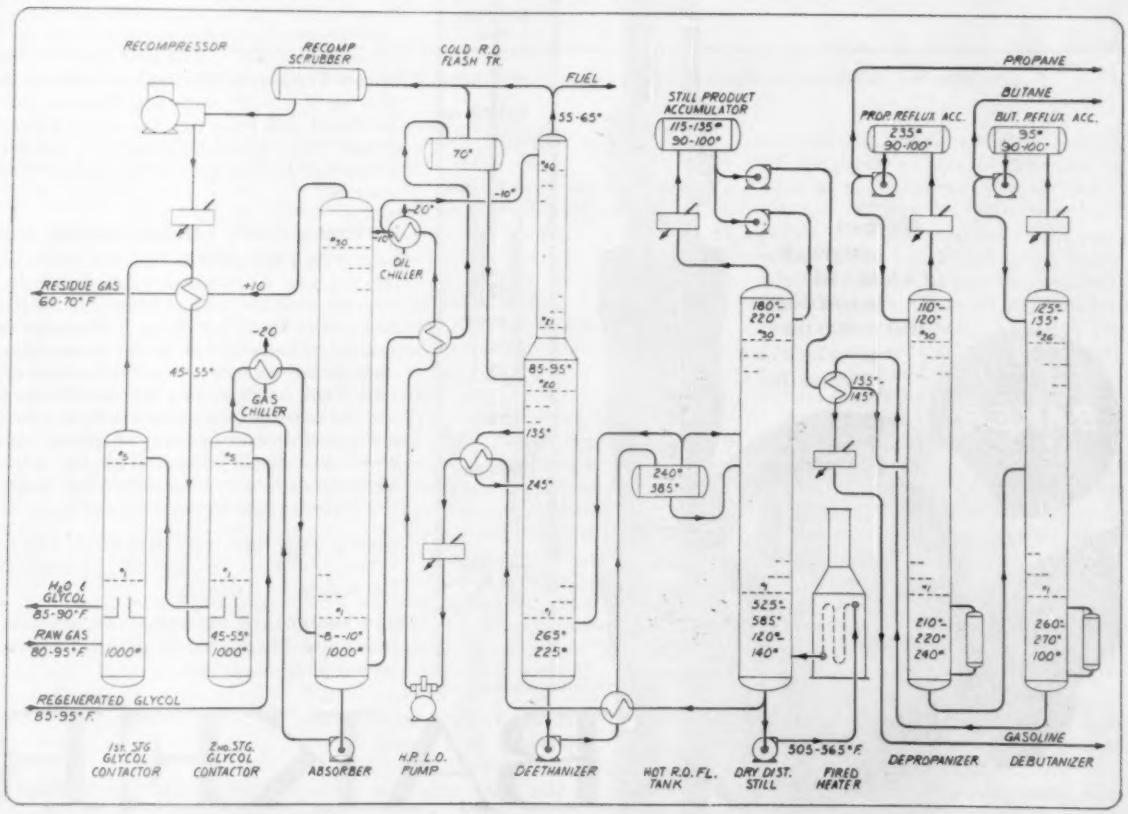
Paper presented at NGAA meeting, Corpus Christi, Tex., January 22, 1960.

The plant . . . Our experience with electronic instrumentation has been with a field processing plant owned and operated by Anchor Gasoline Corp. and located near Mission, Tex., in Tabasco field.

The gas processed in this plant is from two gas-gathering systems operating at different pressures and conditions. Total gas-processing capacity of the plant is 40,000 M.c.f.d. This is a relatively lean gas, having approximately 0.83 gal. of C_3-plus fractions per M.c.f. The liquid end products from the plant are propane, butanes, and/or propane-butane mix, and 12-lb. R.v.p. natural gasoline.

Process . . . Fig. 1 illustrates in general the process involved. The plant is a high-pressure, low-temperature absorption-type unit. Each gas stream is dehydrated and liquids absorbed from the gas in separate systems. The remainder of the plant is one unit.

Important features in this plant are



FULL ELECTRONIC INSTRUMENTATION at Anchor Gasoline Corp.'s Tabasco plant gives smoother, faster startups and shutdowns with fewer personnel. Fig. 1.

It does what a packer is supposed to do... it packs off and stays packed off

an Important NEW Casing Pump Packer

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For downright simplicity (and dependability) this new packer is in a class by itself • It's short—half the length of most casing pump packers • It's shorter because it's simpler. One reason is the simplicity of Baker's rocker-type slips, one of the great advances in slip design in recent years • Operation? That's simple, too, thanks to the J-Slot setting and release mechanism • It's short, so it's easier to ship, to warehouse, to handle. It's simple, so it's easier to run, to set, to unset, to retrieve • Moreover, it does what a packer is supposed to do—it packs off and stays packed off.

It's short and simple... a lean and potent design that makes the price lean and attractive

PRODUCT NO. 640

ITS STAMINA SURPRISED THIS OPERATOR

Operators like this robust new packer, and are a little amazed it takes such a beating. For instance, a Texas operator ran one into a well that was making a lot of water. Casing size was 5½", pump 3¾" with 1" rods, setting 2000 ft., fluid level 1200 ft. To test the packers, he pumped 1200 bbls a day with a 60" stroke, then upped it to 82" stroke and 19 strokes per minute. Result: 2000 bbls a day. The packer didn't creep or leak. That surprised the operator—he had doubted a packer could take that kind of beating. Now he's convinced.

PICTURES SHOW SIX IMPORTANT THINGS

Look at these two pictures. First note there's no tubing. You hang the packer on a large bore pump and run them both in on the rods. Second, it's all done in one trip. Third, you pump through the casing. Fourth, the packer's slips are the same rocker type made famous by Baker's high-performance squeeze tools. Fifth, you don't see a tail pipe. Thanks to the way the packing is designed (it seals by hydrostatic differential) you need neither tail pipe nor set-down weight to maintain pack-off. Sixth, that small hole above the packing is the unloading port that makes this packer so easy to run and retrieve.

WRITE FOR NEW ENGINEERING BULLETIN to Baker Oil Tools, Inc., Box 2274, Terminal Annex, Los Angeles 54, California.

FOR IMMEDIATE INFORMATION, see your local Baker man. This packer is also available through leading pump companies.

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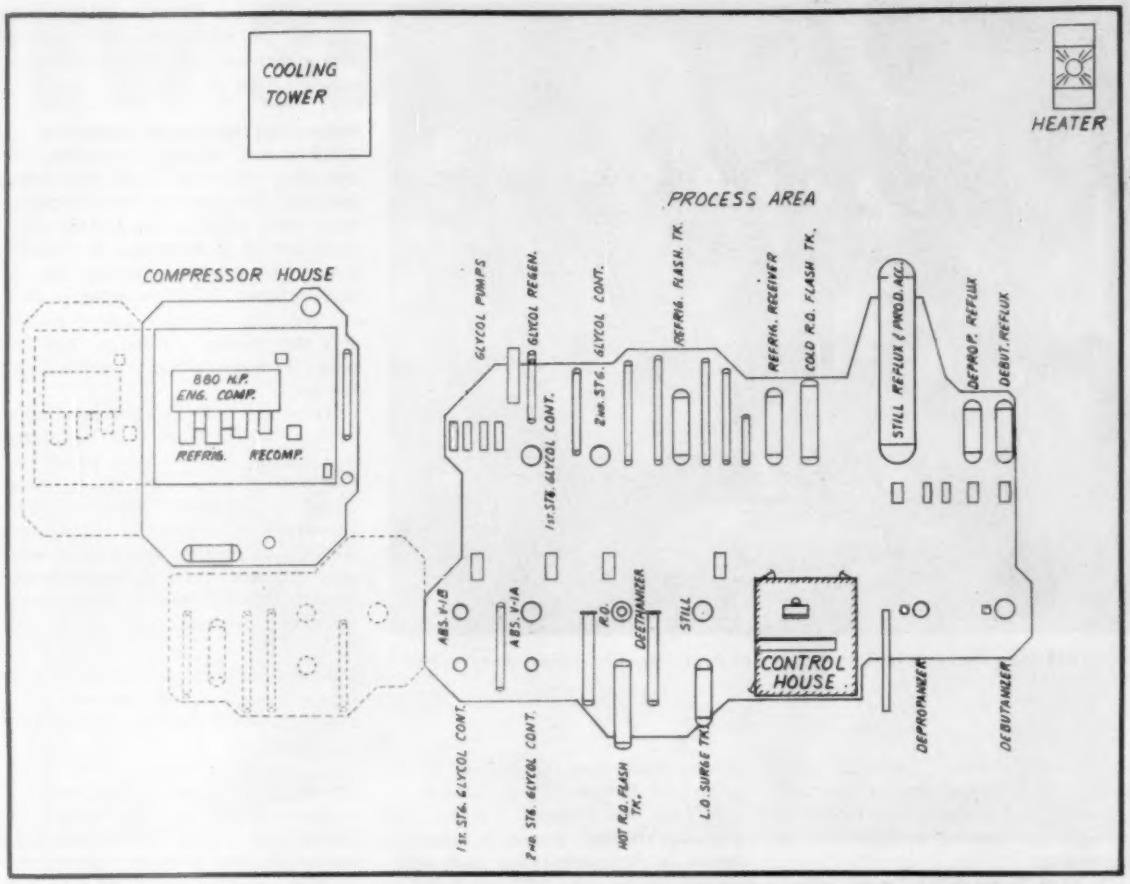


CENTRALLY LOCATED CONTROL HOUSE allows satisfactory operation with one operator per shift. Fig. 2.

two-stage glycol dehydration and a refrigeration system that chills the gas and oil to minus 10° F. Dry distillation is used in separating the products from the absorption oil. The absorption oil is relatively light, being 135 mol. wt.

Heat for product fractionation is provided by hot lean oil, resulting in the use of only one fired heater in the plant. Pumps are electric-motor-driven, and power is purchased from the local power company. Refrigeration and flash gases are compressed in one integral gas-engine-driven compressor unit. Cooling and condensing are done in one induced-draft water-cooling tower. Absorbers, glycol contactors, rich-oil deethanizer, still, and glycol regenerator columns are all equipped with perforated trays. There are no spare pumps or other spare equipment in the plant. Instrumentation and plant design provide for quick shutdown and startup. Plant control approaches automatic operation.

Centralized control . . . Plant personnel consists of superintendent, chief operator, three shift operators, one swing-shift operator, and one maintenance man.

To satisfactorily accomplish the operation with one operator per shift, we used the concept of centralized plant control. The control building was centrally located in the plant area, as shown in Fig. 2. This building houses the control panel and the precision temperature-indicating console.

A view of the panel and console in the control center is shown in Fig. 3. The control panel has 28 direct-connected, panel-mounted pressure gages, an 18-point annunciator alarm system, and 36 electronic instruments.

The electronic instruments consist of 1 temperature recorder, 3 temperature-recorder-controllers, 3 flow recorders, 9 flow-recorder-controllers, 5 pressure-recorder-controllers, 13 liquid-level-indicating controllers, and 2 liquid-level indicators. This results in 21 strip-chart recording instruments and 15 dial-type indicating instruments. All of the dial-type indicators are on level application.

The console is equipped with a precision electronic temperature indicator, with circular scale, range minus 50° to 0° to 600° F. and is coupled with selector switches to check 72 temperature points. Provision is allowed in the console for additional selector switches for 24 temperature points. The desk portion of the console is covered with plate glass, under which is located the process flowsheet. This flowsheet shows all instrumentation points color-coded to match the color nameplates of the instruments on the panel and the temperature indicator points on the console desk.

In this control house, the operator can sit at the console desk and monitor all pressures, temperatures, flows, and levels. This is one of the important factors making feasible the operation of this plant with one man per shift. All temperatures, important pressures, and flows are logged every 2 hours.

Advantages . . . We elected to install electronic instrumentation for the following reasons:

1. There are no distance limitations so far as signal transmission is concerned; therefore, any problem with signal lag was eliminated.

2. There are no moving parts, with accompanying friction and hysteresis, in electronic controllers so their sen-

CONSOLE logs all important pressures, temperatures, and flows every 2 hours. Fig. 3.

sitivities are infinite. Likewise, sensitivities of the transmitting elements are very good so that system resolution is high and precise control may be maintained.

3. Interchangeability among panel-mounted components in temperature, pressure, flow, and level systems has been developed to a high degree through the many plug-in features. Differential pressure transmitters were used on both flow and level and they are interchangeable with calibration adjustments only.

4. We found by investigation that electronic instrumentation entails simple equipment and circuitry. Transmitters, recorders and indicators, controllers, and manual controls perform the same functions as similar pneumatic components but operate electrically instead of pneumatically. Operators without formal training can quickly learn to operate and maintain electronic units. Our first year's operation at Tabasco has proved this to be true.

5. The cost of electronic equipment is no greater than comparable pneumatic equipment. The same size instruments, duct work, etc., were used in this installation that would have been required for pneumatic equipment, and our records show that the installation cost is approximately the same.

Also, in the Tabasco plant, dry, dehydrated, residue gas is used for control-valve actuation. This eliminates air compressors, dryers, and regulating equipment that would be required for pneumatic instruments.

6. Last, but certainly not least, we feel that further extensive advancements in instrumentation and automation in the near future will be in the fields of stream analysis and computing, which will be easier to adapt to electronic than pneumatic control systems.

Interesting applications . . . Possibly the most interesting application that we have involving electronic instrumentation in this plant is the detection and control of a boiling propane level in the thermosiphon-type chillers. The range of the level is approximately 12 ft.

Another very satisfactory application has been temperature control of the fired heater. The control point is in the heater outlet fluid line. The controller is located on the panel in the control center several hundred feet away and controls a motor valve in the fuel-gas line at the heater. Precise control is maintained in this application without any time lag.

Initial startup . . . The initial startup of the plant was extremely smooth and satisfactory. This was in part due to the control center being completely prefabricated, prewired, and pretested, before shipment to the plant site. All of the instruments on the panel were given a final calibration check just before startup. The transmitters were precalibrated at the factory and rechecked after installation and the wiring hookup was completed at the plant.

Subsequent startups and shutdowns . . . After several months' operation, the operating personnel could shut down and start the plant up with increasing ease, when required. At present, shutdown can be accomplished in approximately 10 minutes. Startup can be accomplished in a few minutes after the engine compressor unit is started and the suction, discharge, and bypass valves of the compressor services are set.

There are only two instruments, at startup, which must first be placed on manual control until plant rate is at a point where they can be transferred to automatic operation. This procedure is a process requirement and usually requires less than 30 minutes. All other controls automatically become active as circulation, temperatures, and pressures come up to rate.

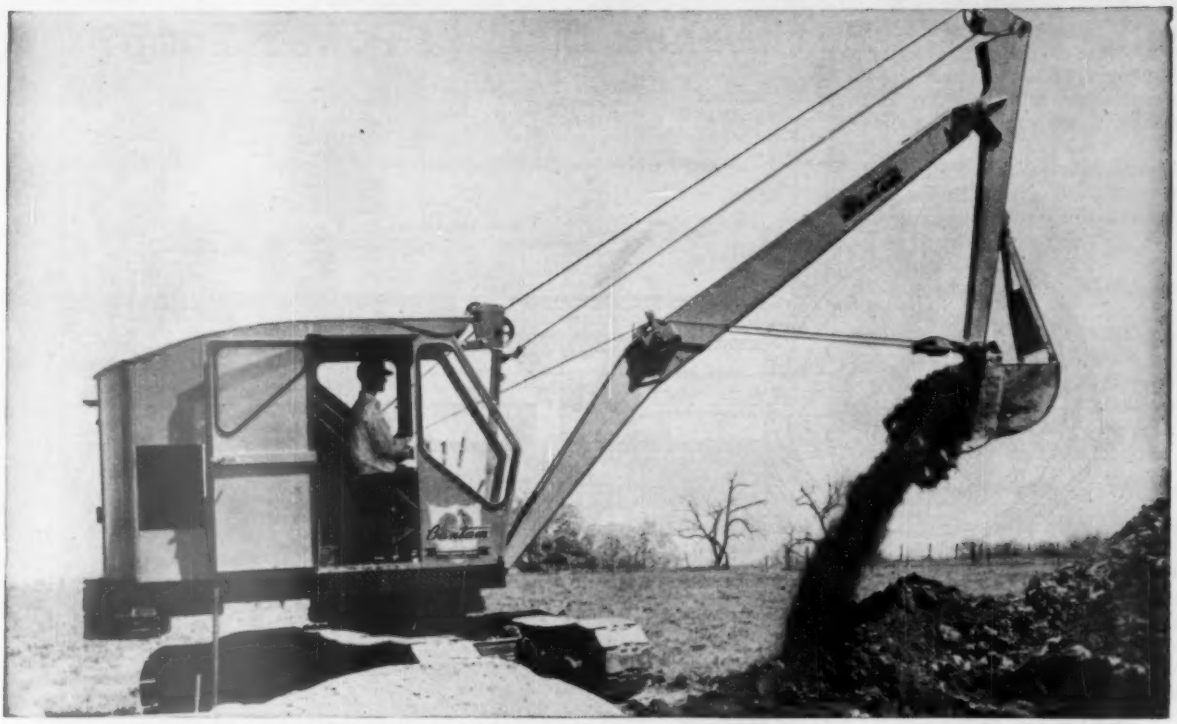
Operator training . . . There was no formal operator training school before the plant was started up. As the plant was being put on stream, operators were instructed in instrument operation by the instrument supplier's field engineers. This training period extended over 3 weeks' time and was an on-the-job type program. Subsequent training on maintenance and operation was carried out by the instrument suppliers' local representatives. This consisted of two 4-day training periods.

At this time, after operating almost a year, the plant personnel are capable of calibrating and checking out any or all instruments in the system.

Operator acceptance . . . Plant operators were experienced to varying degrees in the operation of process plants and the use of instrumentation for process control. No operator, however, has had previous experience in plants using electronic controls. We found them all extremely interested and receptive to the electronic type of equipment, particularly as their experience with it extended. We find now, without exception, that all of the operators are enthusiastic about the equipment in this plant.

We are expanding this plant to process an additional 32,000 M.c.f.d. from another gas stream. Our experience and satisfaction with electronic instruments has been such that we are using them in this expansion, together with further automation, so that we will be able to operate the plant without increasing the number of plant operating personnel.

NEW 350 BANTAMS



—the pipeliner's all-purpose machines!

BANTAM's all-new Series 350 models—carrier mounted, crawler or self-propelled—combine bigger capacity, bigger production and more flexibility to offer more of what a pipeliner needs than any other rigs in their class.

Take this new BANTAM C-350 crawler back hoe. Now it digs to 18'10" deep with new optional long back hoe —with the power and fast-action cycle that take you through even the toughest rocky, frozen or hard pan conditions with highest speed and ease. BANTAM's all-new undercarriage has the solid stability to climb and work tough grades with standard or long side frames . . . the high flotation to give you big production in wet, swampy conditions with pads up to 32" wide. Keep up with any job schedule with BANTAM's *standard* 2-speed independent travel.

High-production trenching *alone* makes the C-350 BANTAM crawler the most profitable pipeliner's rig its size today. But this is only the start! You make more from BANTAM's *all-around job versatility* working with 11 BANTAM-built attachments. Crane capacity of 7 and 8 tons speeds up pipelifting, lowering, placing and stockpiling assignments. It handles cleaning operations and bell-hole excavating as a clam shell . . . or backfilling, tamping, erecting, pile-driving—any job that comes up anywhere, regardless of ground conditions.

The widest choice of options and mountings lets you build a 350 BANTAM exactly to your job and price requirements.

NEW T-350 — all-new carrier mounted BANTAM T-350 has up to 11-ton capacity. Highest mobility, fastest working speed to handle scattered jobs faster. Choice of four new BANTAM-built carrier models. Works with all 11 BANTAM-built attachments. Remote control available.

NEW CR-350—all-new BANTAM self-propelled has 1-engine, 1-man operation and travel. Ideal pipe-handling rig in yards, rail sidings, on the job. Automotive-type power steering, optional 4 x 4 drive. Eleven-ton capacity. Works with all 11 BANTAM attachments.

World's largest producer of truck crane-excavators

SCHIELD Bantam Co.

Schield Bantam Co., 243 Park Street, Waverly, Iowa PC-218
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Company.....
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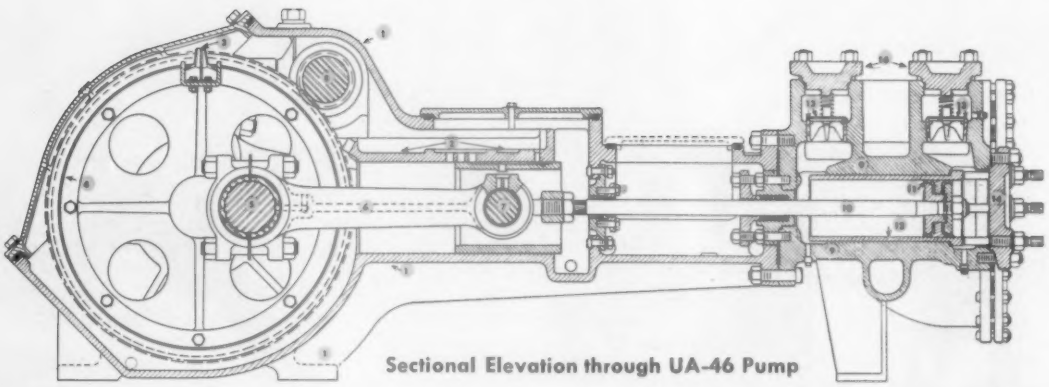
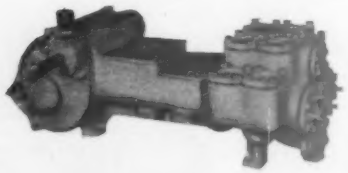
Ever look inside a

Bethlehem Duplex Power Pump?



Sectional Elevation through UA-46 Pump

1) Frame—one piece alloy-iron casting, rib-reinforced
2) Oil Chest—"heart" of the controlled-gravity-flow lubrication system
3) Oil Scraper—collects lubricant from gear rim to supply oil to all parts of power end
4) Main Gear—removable continuous-tooth herringbone
5) Crank Shaft—steel casting, normalized and tempered
6) Connecting Rod—normalized and tempered steel; H-section design
7) Crosshead Pin—alloy steel, hardened and ground
8) Pinion Shaft—heat-treated forged steel with integral pinion gear
9) Fluid-End Casting—moly-iron, steel, or aluminum-bronze
10) Piston Rods—steel, stainless steel, or aluminum-bronze; API taper or straight shank
11) Pistons—chrome-iron snap-ring, composition-cup, or slush type
12) Liners—interchangeable; alloy cast iron, hardened aluminum-bronze, or special order materials
13) Valves and Seats—hardened steel, aluminum-bronze, slush-type, or Nylon disc; interchangeable
14) Valve Covers and Cylinder Heads—moly-iron, steel, or aluminum-bronze



Inside and out, the durability of our U-series pumps is plainly evident. Solidly built for continuous operation at full load, these heavy-duty pumps are designed to give long and economical service in many kinds of applications:

- **Waterflooding, disposal, and supply systems**
- **Mud transfer and general drilling service**
- **Crude oil pipeline and gathering**
- **Products, LPG, and oil-processing service**

Ask our nearest office or store for complete details. Or write for descriptive literature.

There's a size for every job. Choose between the U-33, UA-46, and U-510

Capacities: 155 to 13,500 BPD
Piston-Rod Loads: 2,400 to 12,000 lb
Pressures: 340 to 1,698 psi

For higher pressures, investigate Bethlehem's Triplex pumps, the TP-3, TP-4, and TP-6

Capacities: 100 to 9,565 BPD
Plunger Loads: 3,580 to 10,000 lb
Pressures: 438 to 3,183 psi

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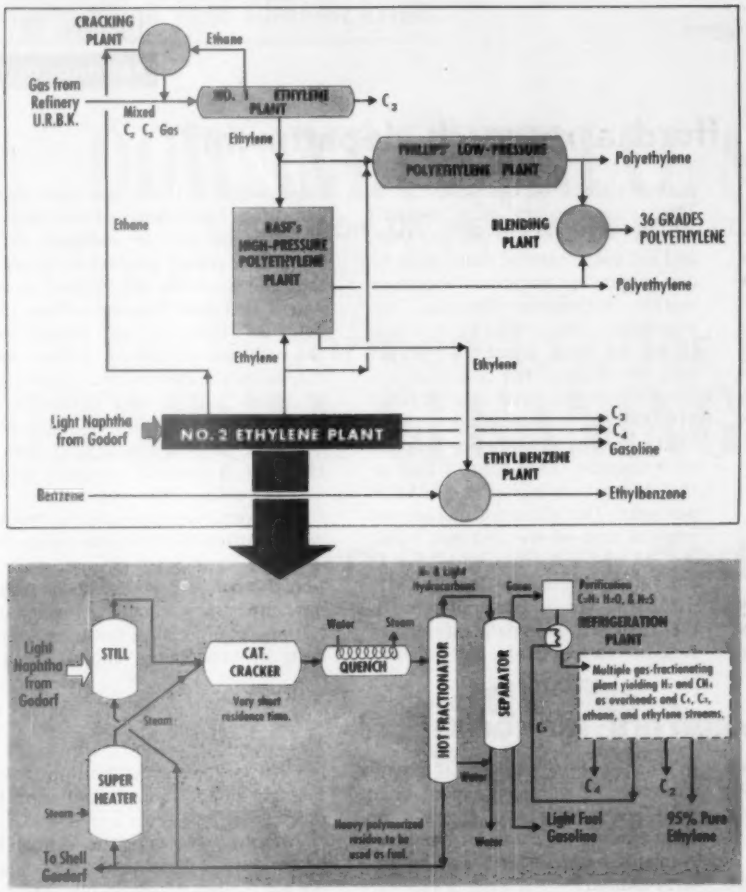
BETHLEHEM STEEL SUPPLY DIVISION



GERMAN PETROCHEMICAL plant can turn out 36 different grades of polyethylene by blending low-pressure and high-pressure products.

ROW plant typifies progress of Germany's petrochem industry

Investment will reach $70,000,000 by next year

THE PETROCHEMICAL industry in Germany has grown rapidly over the last 2 years and is now fourth largest in the world, behind the United States, the United Kingdom, and USSR.

A prime example of this growth is the Rheinische Olefinwerke G.m.b.H. (ROW) established in 1953. This was a 50-50 joint venture by Deutsche Shell AG of Hamburg, and Badische Anilin- und Soda-Fabrik AG (BASF) of Ludwigshafen, Germany. The original ROW plant, opened in 1955 at Wesseling, represented an investment of just over $10,000,000. In the last 4 years, this investment has grown to $35,000,000 and will reach $70,000,000 by 1961.

Raw material, mixed C_2 gases, for the ROW plant was obtained from the Union Rheinische Braunkohlen-Kraftstoff AG with which Shell cooperates. In 1956 it was decided to expand ROW. Since the original raw-material source was not adequate to meet the increased needs, an M. W. Kellogg cracker was installed to operate on light naphtha from Shell's neighboring Godorf refinery. This unit supplies feed stock for the new No. 2 ethylene plant.

During 1956, ROW produced 6,500 tons of polyethylene and 12,000 tons of ethylbenzene. The present annual capacity of the works is:

Cracking gases to produce ethylene	50,000 tons
Polyethylene	
high-pressure	35,000 tons
low-pressure	6,000 tons
Ethylbenzene	12,000 tons
Epikote	2,000 tons

The Shell Epikote plant was put in operation at ROW in 1958.

Cracker Yields Number of Products

The original olefin plant produces both saturated and unsaturated C_2 gases, which are separated at −120° C. under pressure to give a 99.9% pure ethylene. The new naphtha cracker yields a number of products from heavy polymerized oil to hydrogen. Ethylene makes up 25% of this mixed product.

High-pressure polyethylene is made by means of a process developed by BASF using 1,500-atm. pressure. The low-pressure polyethylene is made under license granted to BASF by Phillips Petroleum Co. requiring only 10 to 40 atm. pressure.

The low-pressure polyethylene has a density of 0.96 and the high-pressure product a density of 0.92. With these two grades of polyethylene, it will be possible to blend any density and quality required.

Actual production of Lupolen (Ludwigshafen polyethylene) in 1958 was 24,000 tons, all the high-pressure type; the new low-pressure plant was still under construction. When all expansion now under way is completed in 1962, the ROW plant's annual capacity will be:

Ethylene	125,000 tons
Pure olefin other than ethylene	75,000 tons
Polyethylene	
high-pressure	100,000 tons
low-pressure	12,000 tons
Ethylbenzene	12,000 tons
Epikote	2,000 tons

Production of ethylbenzene is regulated by the needs of the BASF which requires this intermediate for the manufacture of styrene and polystyrene. The total capacity is not likely to exceed 12,000 tons per year.

BY W. L. NELSON
Technical Editor and Petroleum Consultant

Can small refiner afford a research department?

Your "Royalties—or Research" suggests that small refiners can either pay royalties or operate a research department. Doesn't a research department cost too much for a small refiner? G. F. M.

According to Process Costimating No. 7, "Royalties — or Research," April 7, 1958, p. 170, the cost of royalties or of research now exceeds about 3 cents per barrel. This is an amount that in nearly all situations would support a research department:

20,000 B/D	$219,000 per yr.
50,000 B/D	$547,000 per yr.
100,000 B/D	$1,095,000 per yr.

An effective research department can be operated for as little as $130,000 per year although this is probably the lowest practical limit. The average salary of a research scientist is $9,000-$10,000 per year, and for each scientist there must be one supporting employe (laboratory worker, technician, librarian, stenographer, mechanic, etc.) whose salary averages about $4,500 per year. In addition, the cost of equipping a scientist averages at least $10,000 per year making a direct total of about $25,000 per year for each scientist. Thus four or five research workers will cost $125,000 per year. This does not include the original cost of the research building or the expenses involved in entering the research field.

Of more practical significance is the inability of small refiners to free themselves from the payment of royalties or of service fees that are the equivalent of royalties. There is no way to suddenly discover a cracking process or to obtain and establish the validity of a patent that will free the refiner of royalties. Over a long period of years, however, such protection can be established by the obtaining of many patents and particularly one or two important ones that can be used for bargaining purposes. However, a research program does not guarantee discoveries.

Considerable experimental work not dignified by the term research is being conducted by most refiners, such work as developing new uses for products, altering or testing equipment, lowering the costs of production, and so forth.

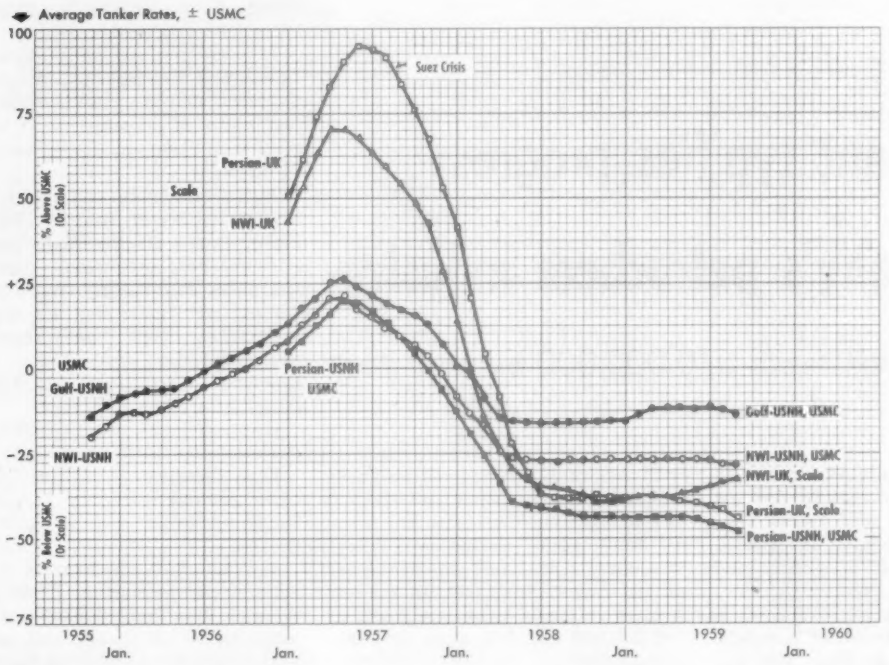
What are average current tanker rates?

Average tanker rates were shown in your answer of June 30, 1958. Do you have more recent values for 1959? R.G.P.

Average tanker rates computed by the method suggested on this page, October 21, 1957, p. 134, are shown in Fig. 1 for crude oil shipments. The average rates partake of break-even costs, long-term charters, and the amounts of crude oil handled in company-owned vessels and by long-term charters.

So many so-called supertankers have been launched during the last few years that a revision to lower average tanker rates should soon be made.

Although average rates cannot be perfect, if they are used in comparing the values of crude oils, the imperfect rates probably introduce only very small errors.



AVERAGE tanker rates for crude oils as percentage plus or minus USMC (or scale) rates. Fig. 1.

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DIVISION OF THE DOW CHEMICAL COMPANY

formed to offer the
CHEMICAL CLEANING SERVICES

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DOWELL

DOWELL DIVISION OF THE DOW CHEMICAL COMPANY

Dow Industrial Service will be an organization devoted exclusively to helping you solve maintenance and disposal problems. It will offer an expanded scope of operations designed to be of greater service to all types of industry.

- The new organization will offer the cleaning services proved in plants throughout the U. S. by Dowell during the past 20 years.
- Chemical cleaning personnel will be the same engineers and operators you have known in Dowell.
- Specialized cleaning equipment will be provided from the same stations and offices — located in major industrial areas.
- The research program which has provided many major advances in cleaning techniques and chemicals will be continued — and expanded.

Dow Industrial Service will welcome the opportunity to discuss your cleaning problems on all kinds of equipment in all industries—steam generators, process equipment, heat exchangers, towers, water and product lines, water wells and tanks.

The new organization will also offer consulting services, and a line of chemical products for use in water and waste treatment.

Dowell will continue to offer services and products to the drilling and producing segments of the oil industry.

For service or more information call the office or station near you. Or write Dow Industrial Service, 20575 Center Ridge Road, Cleveland 16, Ohio.

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DOW INDUSTRIAL SERVICE

DIVISION OF THE DOW CHEMICAL COMPANY

DOW

▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .

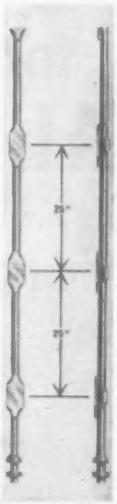
Alarm sounded on high temperature

. . . by a new device now available, called a Temp-O-Larm. The equipment comprises a thermostat preset to actuate at any desired temperature. When the temperature in a production unit reaches the preset temperature, the device sends a signal to an annunciator which causes audible or visible alarms to sound either locally, at a remote location by use of a telephone line, or both.

Each annunciator has an alarm-time delay that can be set from 0 to 6 hours. This overcomes the possibility of false alarms during expected and normal overheat temperatures. Only when the danger temperature has been experienced for a period longer than the setting on the time delay does the device sound a warning. The equipment can also be used to warn of low temperatures.

It operates on 115-volt 60-cycle a.c. power with all exposed connections of low voltage. Most any commercial thermostat can be used. Delivery time: 10 days. Approximate price, f.o.b. factory, ranges from $240 for power supply and annunciator protecting one location up to $600 for protection of six locations. Any number of locations can be protected. Source: **Kidde Ultrasonic & Detection Alarms, Inc., Clifton, N. J.**

Paraffin scraper



. . . can be permanently attached to do away with paraffin accumulation. The Mark III scraper has a 4-in. scraper blade attached with a single clip which holds as firmly as blades with two or more clips, the maker claims.

The maker also reports that stress points between clips are eliminated, thus eliminating fishing jobs due to breaks between clips. The preformed single-clip blade prevents misalignment on the rod, helps hold the blade in place, and acts as a guide for easier running of rods into tubing. The scraper is attached to the rod to a depth where paraffin accumulation starts, and the rod string is rotated on each reciprocation by a rod rotator.

The scraper moves three ways, up, down, and rotary, to remove paraffin in small particles from the tubing wall. Delivery time: immediate. Approximate net price, f.o.b. factory, is $205 per 1,000 ft. Source: **J. M. Huber Corp., Box 831, Borger, Tex.**

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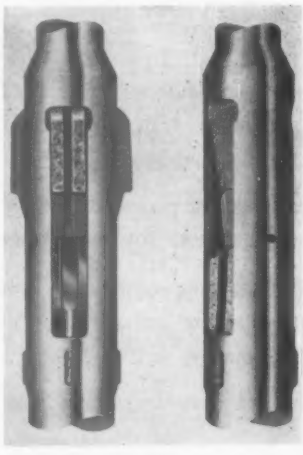

Section-mill

. . . development announced is this Body-Lock section mill which, the maker claims, consistently mills 30-ft. sections in all weights of casing at

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Described in *OIL AND GAS JOURNAL - Issue of February 8, 1960

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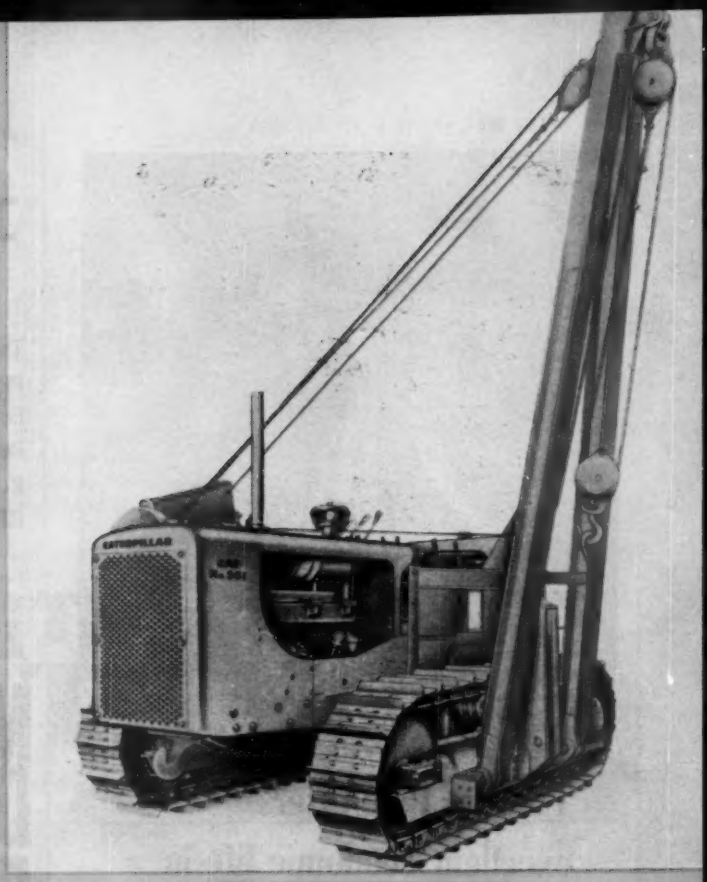
—a medium-sized rig with big production features!

38,800-lb. lift with hydraulically adjustable 5,000-lb. counterweights (optional)—two other stationary counterweight arrangements available in 2,500-lb. and 3,500-lb. groups • 93 HP • Direct drive with exclusive Caterpillar oil clutch • Heavy 15' boom (12½' and 18' booms optional) • 3-speed lift, 1-speed lower winch transmission • Fast, convenient controls that are easy to reach and easy to operate with safety engineered into every motion • 10½" ground clearance • 74" gauge tracks • Heavy-duty lifetime lubricated undercarriage.



Caterpillar announces the new No. 561 Series B Pipelayer

93 HP • 38,800-lb. lift

Here's an all-new medium-sized pipelayer with the features, power and range of lifting capacities to handle a multitude of jobs easier and faster on your spread. Built with all the quality and stamina of the giants of the Cat pipelayer line, it is designed to keep working profitably for you over the roughest ground and most abrasive soils.

Here are some reasons why. Its new Cat Diesel Engine delivers high torque at low speeds, long life under full loads. Its heavy-duty undercarriage features lifetime lubricated track rollers and idlers that never need on-the-job servicing and hydraulic track adjusters that permit track adjustment with the easy stroke of a grease gun. And its oil clutch is built to operate a long, hard season without adjustment.

These and many other features are listed briefly. Look them over. But for the full story, see your Caterpillar Dealer. Get the complete facts about the all-new No. 561 from him. Ask him to demonstrate. See for yourself how you can use it in your spread on a wide range of jobs.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

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HEAVY-DUTY PIPELAYERS FOR THE HARD WORK

Transite System at Inspiration, Arizona, carries fluids ranging up to 54% of solid.

Priced right . . . formulated right—

Transite Pipe offers excellent economic life in dual-process ore extraction

Faced with the problem of mining lower grade ore, Inspiration Consolidated Copper Company switched to dual process ore extraction—an efficient, profitable process. But one that means piping systems must withstand a variety of aggressive service conditions.

To assure good economic life, yet keep the pipeline's cost low, Inspiration engineers chose Johns-Manville Transite® Pipe. Through experience, they know its rugged asbestos-cement formulation together with its installation economy assure excellent economic life in services where many types of liquids must be moved without interruption.

Transite keeps installation costs low because it is lightweight and easily handled . . . quickly assembled with the patented Ring-Tite® Coupling. Let us send you TR-51A, a new 12-page brochure which describes the corrosion resistance of Transite Pipe. Write Johns-Manville, Box 14 EQ, N.Y. 16, N.Y.

Ring-TiteCoupling provides a tight seal at every joint in the system.

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another great ***MARTIN-DECKER*** *achievement!*

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PRESSURE GAUGE:

The First Accurate PRESSURE GAUGE! For Applications Requiring . . . RUGGEDNESS and DEPENDABILITY

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10,000, 15,000 PSI.
Metric Equivalents Available.

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New Equipment

rates of up to 5 ft. an hour in one trip.

A basic feature of the mill is that the cutter bases are broad and have three cutter blades locked tightly within the tool body during operation. This overcomes the danger of cutter arms breaking off or bending and prevents the blades from being collapsed by side pressure.

Both hydraulic and mechanical forces are used to activate the blades and hold them in operating position. A hydraulically driven piston drives the cutters up the inclined planes of the wedge mandrel within the body pockets. Cutter blades are faced with fragmented tungsten carbide. The tool is available for rental in the United States and for sale in export. Source: **Grant Oil Tool Co., 2042 East Vernon Avenue, Los Angeles 58.**

●

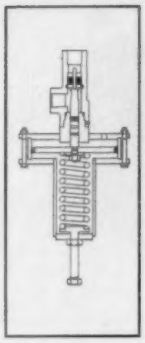
Nut splitter

. . . cracks nuts easily and quickly, making stubborn "frozen" and rusty nuts easy to get rid of. The HKP swivel-jaw nut splitter is designed to cut nuts up to ⅞ in. across the flats.

It is operated by placing the unit's swivel blade against the side of the nut and turning the power screw by hand until the jaw is tight against the nut. The screw is then tightened further by hand or power wrench until enough pressure is applied to split the nut.

The maker says the tool will not damage the bolt from which the nut is removed. The swivel blade is made of tempered tool steel. Jaw, handle, jaw-pivot bolt, and power screw are of alloy steel. The hand grips are of plastic. Delivery: immediate. List price: $19.80. Source: **H. K. Porter, Inc., 74 Foley Street, Somerville 43, Mass.**

Dump valve



. . . powered by a piston motor has been recently developed to provide greater power in a more-compact package than older types offer. The valve, designated Check-Stream, is designed to give positive shutoff. A solid-rubber cylinder, expanded against the body liner by the piston motor, provides shutoff. The piston is opposed by a spring that closes the valve when instrument output pressure is zero. The spring drives the valve shaft forward. The shaft operates against a movable spider on the rubber cylinder and causes the spider to move forward. This expands the rubber cylinder against the body liner and effects the shutoff.

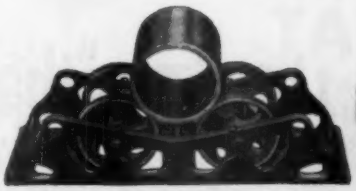
The valve is designed to provide throttling action too. When the control instruments exert enough air pressure to balance the force of the spring, the piston moves upward. This lets the rubber cylinder contract and liquid flow between the cylinder and body liner. The valve can be field-inspect-

PETOL & TITAN TONGS

"Most Complete Line of Tongs in the World"

TITAN PIPE TONGS

PETOL PIPE TONGS



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PETOL STABBING TONGS

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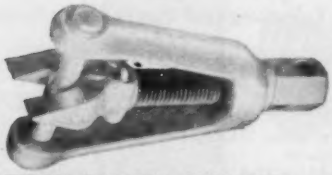

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28 Types—A Type For Every Purpose
290 Sizes—A Size For Every Requirement

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PETOL & TITAN TOOLS SOLD BY LEADING SUPPLY STORES EVERYWHERE

You find Gates Hose where anything flows. Fremont Canyon Tunnel, $14,500,000 project near Casper, Wyoming where more than 22,000 feet of Gates Air Drill and Water Hose have been used. Workmen here are drilling prior to blasting excavation for substructure of powerhouse. Air hose is Gates 18MB Wire Braid Air Drill Hose.

Gates Air Hose delivers on the job "that couldn't be done!"

Industry everywhere uses impressive amounts of air, water, steam, suction and many other hoses in the full range of types and sizes made by Gates.

Back of the world-wide acceptance of Gates Hose is a continuing program of *specialized* hose research at the multi-million dollar Gates Research Center, staffed by more than 200 chemists, physicists and engineers.

It is the aim of this *specialized* research to increase hose utility and life . . . lower Industry's annual hose cost.

Because Gates Hose is so widely preferred, it is quickly available from leading distributors in all industrial centers in the United States and in 90 countries throughout the world . . . and its outstanding performance is guaranteed by the *World's Largest Maker of V-Belts.*

Gates 18MB Wire Braid Air Drill Hose, with oil resistant tube and abrasion resistant cover, gives exceptional performance on all heavy duty air usage under the most severe working conditions. This popular hose — one of many in Gates full line — is always available from your nearby Gates Distributor.

The Mark of *Specialized* Research

Gates

The Gates Rubber Company • Denver, Colorado

Gates Rubber of Canada Ltd., Brantford, Ontario

Gates Industrial Hose

Made in a Full Range of Types and Sizes

TPA 459

ed while it is in the line. Both screw and flanged ends are available.

The valve comes in 1 and 2-in. sizes. It has a cast-steel body, fabricated piston housing, and synthetic-rubber shutoff. Working pressure is 1,420 psi. at 150° F., except as limited by flange rating. Delivery time: 3-4 weeks. Approximate price, f.o.b. factory, ranges from $150 for 1-in. to $255 for 2-in. size. Source: **APCO Div. of Textron, Inc., 616 West Whittier Boulevard, Whittier, Calif.**

●

Scraper passage

. . . is indicated by a new pipeline development, the Pig-Sig II scraper-passage indicator. The trigger extends through the pipe wall and is tripped by the scraper, thus actuating either an electrical or visual signal.

The device is compact and can be installed or removed under line pressure. Operating direction can also be changed under pressure and there is no packing to tighten.

According to the manufacturer, the device has accurate repeatability and is suitable for metering or calibration. It can be installed with the manufacturer's various tapping machines using a conventional drill. Compared with the maker's original signal device, this one has a longer trigger and detects scrapers in oversize pipe or scraper traps. Details are given in Bulletin A-199. Source: **T. D. Williamson, Inc., Box 40, Tulsa 2.**

●

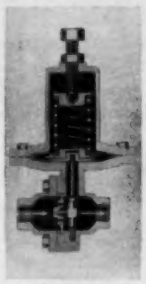
Open-side socket

. . . eases tightening of union nuts on external tube connectors. The tool eliminates manual tightening of union nuts by permitting a tool operator to use a 1-in. impact wrench to do the job.

The open-side feature permits the tool operator to insert the socket over a 3⅛-in. hexagon union nut and a 3⅜-in. hexagon cone plug nut. The cutaway portion also provides clearance for the bend during the driving operation.

Two safety stops inside the nose end of the socket help prevent the socket from slipping when the tool operator pushes down during the nut-running operation. Source: **Apex Machine & Tool Co., Box 952, Dayton 1, Ohio.**

Low-flow seats



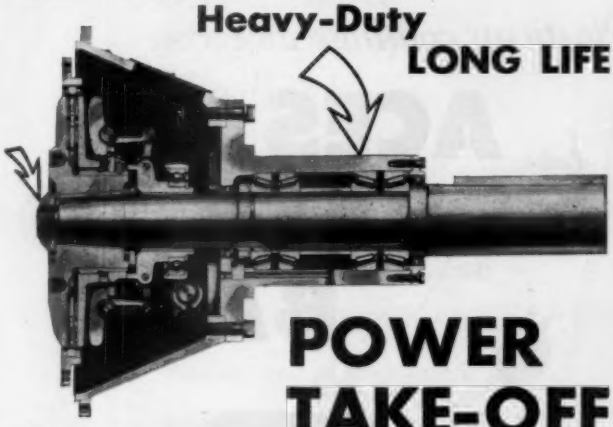
. . . available for sliding-gage regulators and control valves in sizes from ¼ through 3 in. The low-flow seats can be used where initial requirements are for a low flow but later needs are for high flows, where the strength of full line-size valves is needed but low flow is required, or to replace seats in an oversized valve body.

ROCKFORD

OIL FIELD TYPE

Heavy-Duty

LONG LIFE



POWER TAKE-OFF

PROVIDES FOR A Perpetual Oil Bath for the Main Bearings

The special, large Timken main bearings in the Heavy Duty ROCKFORD POWER TAKE-OFF run in a reservoir of lubricating oil. The main bearings are adjusted when assembled at the factory and require no further adjustment. The clutch throw-out bearing is lubricated at the factory and requires no further attention. Cut down on the servicing time needed for your equipment by specifying this new ROCKFORD OIL FIELD TYPE POWER TAKE-OFF and save time and labor costs.

No Pilot Bearing.

Small Spring Loaded

Heavy Duty Spring Loaded

Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

BW SEND FOR THIS HANDY BULLETIN

Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER

1305 Eighteenth Ave., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES

The manufacturer says the seats are self-lapping and self-cleaning in operation and give tight shutoff. List prices of the low-flow seats, ordered separately, range from $45.50 for a ¼-in. size up to $175 for a 3-in. size. Source: **OPW-Jordan, 6013 Wiehe Road, Cincinnati 13.**

●

New flocculant

. . . for water just made known is a synthetic high-purity type produced especially for use in treatment of potable water. Designated Purifloc N17, it is described by the manufacturer as a high-molecular-weight flocculant with high activity for many types of suspended solids normally found in natural waters and produced by chemical treatment.

Suggested applications include use as a primary coagulant for presedimentation, conventional, and high-rate (sludge-blanket) water-treatment plants; as a coagulant aid to enhance the activity of primary flocculants such as alum and ferric sulfate; as a coagulant or coagulant aid in chemical softening operations to reduce the load of suspended solids to the filters; and as a clarification aid to allow design of rapid sand filters to operate at double or triple conventional hydraulic rates and yet produce water of equal or better quality. Source: **Dow Industrial Service, Div. of Dow Chemical Co., 20575 Center Ridge Road, Cleveland 16.**

●

Two-way mobile radio

. . . is compact, transistorized, and designed to provide economical communications between vehicles or between a vehicle and a fixed station in an office or dispatch point. The Model LD-150 unit is frequency-modulated and uses a transistorized power supply.

It comes in 30 and 60-watt models and can operate on any frequency in the 148 to 174-mc. band. Transmitter, receiver, and power supply are housed in a functional-design, dustproof steel case which can be mounted under a vehicle's dash. The control unit can also be dash-mounted separately, with the main equipment case installed in a car trunk or a suitable location in a truck cab. Delivery time: 45 days. List price: about $595. Source: **Radio Corp. of America, 30 Rockefeller Plaza, New York 20.**

●

Crane eases lifting

. . . for loads of up to 1,250 lb. The Model WC557AR High Boy crane, with the mast and boom fully extended, will lift weights up to 750 lb. to a height of 14 ft. With the boom fully retracted to 34 in. and the mast and brace fully retracted, it will lift 1,250 lb. to a height of 8 ft. 8 in., the maker says.

A spring-loaded rachet lock is used to assure safe operation and to hold loads at any position. Standard equipment includes the sheave block and 45 ft. of 3/16-in. wire rope. The winch has 10-in. pneumatic wheels in front and 6-in. semipneumatic casters in back. Delivery time: 5 days. List price is about $392. Source: **Thern Machine Co., Winona, Minn.**

Plasticap coatings give you

ACES BACK TO BACK

Your ace in the hole is the Plasticap baked on plastic coatings that eliminate replacement of corroded pipe and fittings. Backing it up you'll find field office service and follow-up. With 3 plants and 8 offices strategically located to serve you, the man from Plastic Applicators is always Johnny-on-the-spot.

Plasticap
PLASTIC APPLICATORS INC.

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FAST, SAFE PIPELINE REPAIRS WITH NEW SMITH SPLIT-COUPLING

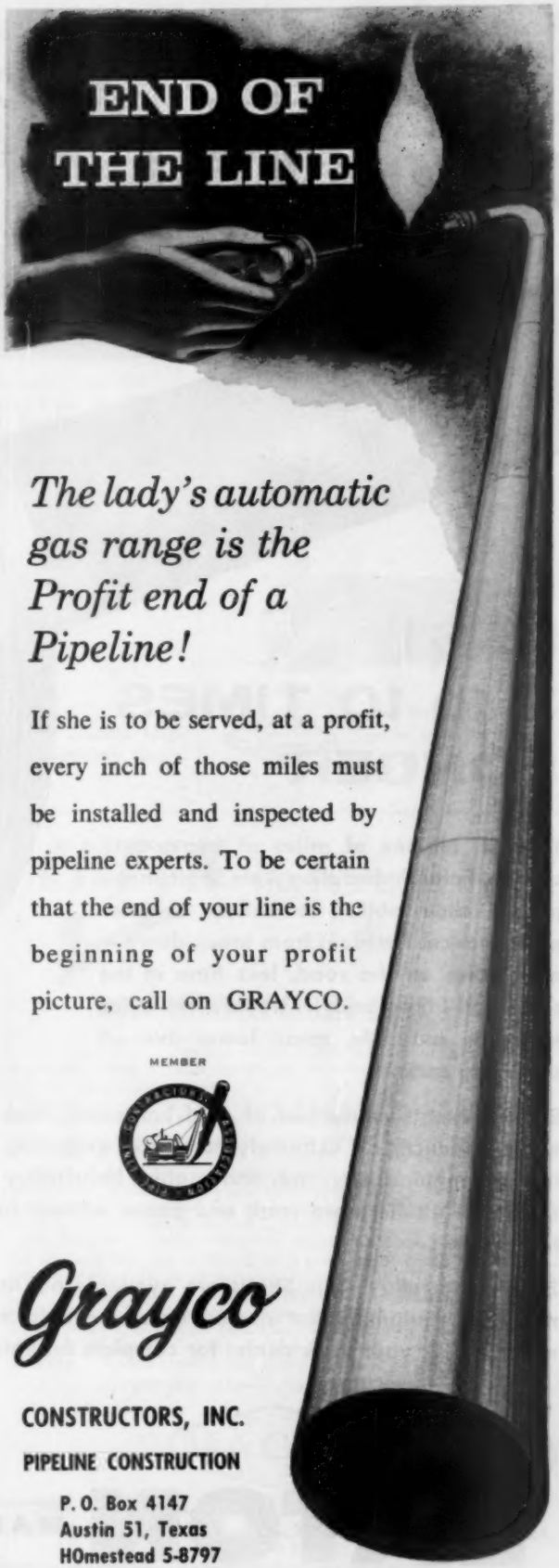
Completed Installation

Completed Installation (When welding is Specified)

The Smith Split-Coupling can be used as coupling, repair clamp or split sleeve.
Easy installation—Place halves around pipe. Tighten side bolts.
Permits welding while pumping.
Available in standard pipe sizes.
Extra lengths and special dimensions on application.

THE PIPE LINE DEVELOPMENT CO.

5700 Detroit Avenue · Cleveland 2, Ohio



The lady's automatic gas range is the Profit end of a Pipeline!

If she is to be served, at a profit, every inch of those miles must be installed and inspected by pipeline experts. To be certain that the end of your line is the beginning of your profit picture, call on GRAYCO.

MEMBER

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PIPELINE CONSTRUCTION

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Austin 51, Texas
HOmestead 5-8797

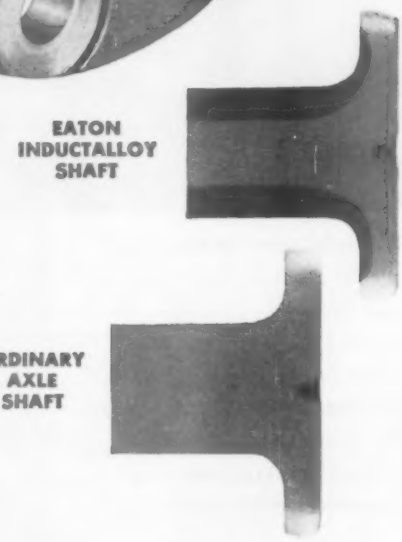
In New Trucks or Old—
EATON INDUCTALLOY
AXLE SHAFTS

LAST 3 to 10 TIMES LONGER

Through billions of miles of heavy-duty service, Eaton Inductalloy Axle Shafts have proved their ability to deliver superior performance. Freedom from break-down—more time on the road, less time in the shop—plus thousands of trouble-free miles added to axle life, mean lower over-all operating cost.

Eaton's exclusive method of dual hardening truck axle shafts produces an extremely hard case extending deep into the material structure, and enables Inductalloy Axle Shafts to handle more work and abuse without fatigue failure.

Eaton Inductalloy Axle Shafts are available not only in new axle equipment, but also as replacements for earlier models. Ask your truck dealer for complete information.



EATON

AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

Filtration rates

. . . found fast with a recently developed high-temperature, high-pressure filter press. The Fann Model T35-A test instrument can also be useful to find the water loss of drilling muds, cement, and fracturing fluids under conditions approximating those met in actual field practice. Time required for a test is only about an hour.

Made of heavy-gage sheet steel with a wrinkle-gray instrument finish, the unit is mounted on a 1½-in. molded wood base. Dimensions: 36 in. wide, 25 in. deep, and 19 in. high. Delivery time: 30 days. List price: from about $2,000 for base instrument up to $2,500 for instrument and extra attachments. Source: **Fann Instrument Corp., Box 6101, Houston 6.**

Double-acting grease gun

. . . now on the market, a lever type, provides either high-pressure or high-volume delivery of lubricant by means of a simple shifting device. To change pressure ratios, you need only shift a latch pin in the handle from one slot to another.

The manufacturer states that pressures up to 10,000 psi. can be obtained in the high-pressure position. Full pressure can be obtained with a stroke length as short as ¼ in., making it suitable for close quarters.

The nozzle extension swivels 360°, making it easy to get to usually hard-to-reach fittings. The gun can be loaded three ways: with 14½-oz. cartridge, filler pump, or suction. The gun measures 20 in. long with a barrel diameter of 2¼ in. Delivery: immediate. List price of the Model 1013 gun is $9.95. Source: **Lincoln Engineering Co., 4010 Goodfellow Boulevard, St. Louis 20.**

Sauder introduces the original... econo-pak

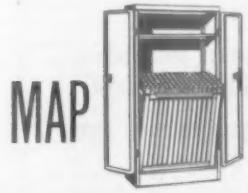
Now — **proved** in full-time use on lines throughout Kansas and Oklahoma. Sauder's **Econo-Pak** is the first truly economical, packaged gas production unit for gas condensate production. No one offers a more complete or better fabricated unit!

Fully winterized! All controls are centralized in a glass-fiber insulated, heated, steel housing. Uncomplicated, simple to operate and maintain. Backed by 35 years of specialized oil field service!

Write or phone for complete information:

Sauder Tank Co., Inc.

Phone DI 2-2550 • Emporia, Kansas



CONFIDENTIAL — DOORS LOCK!

The sturdy MT4 steel cabinet map file has 112 tilting tubes. Easy to file and find maps, tracings and blue prints to 60" lengths. Keeps valuable information dust proof and confidential. Popular everywhere in both field and home offices. Write for illustrated information.

SHIPPED IMMEDIATELY FROM STOCK
Patent No. 1610368. Other Patents Pending.

SCOTT-RICE CO., 610 S. Main, Tulsa 19, Okla.

Dual-Seat

Triple-Seal

Auxiliary

CHECK the features of these...

MACCO NORMALLY CLOSED CHECK VALVES

The Dual-Seat: This normally closed 5000# W.P. Macco check valve is dual seating—first, a metal shoulder on a "resinoid" disc and also metal-to-metal under high pressure.

Installed on a Macco gas lift valve, this check valve positively prevents back flow of fluid from the tubing to the casing. It is also possible to acidize the formation or back-pressure the tubing without exposing the casing to either acid or extreme pressures. A scientifically designed hollow "float" allows all of the gas or fluid which passes through the check valve to pass through the lateral openings and hollow stem. This feature, a patented design, provides protection for the spring and makes it particularly resistant to the ill effects of abrasive erosion.

The Triple-Seal: Another "First" by Macco, this outstanding check has the dual seat float plus an O-ring tip to give *extra insurance* against even the most minute passage of fluid, gas or sand.

The Auxiliary: Again a "First," this Macco check is another major development in gas lift equipment evolution. It is used as an auxiliary with a regular check in multiple completions where mud cake may jam balls of gravity, magnetic or velocity checks during the long waiting periods. In this check, a squeeze-proof resilient sleeve seals on a perforated inner core.

Write for Check Valve Brochure.

MACCO

MACCO OIL TOOL COMPANY, INC.

1521 Prince P. O. Box 7288 Houston 8, Texas
Phone UN 1-1253

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

313 WILSON, SO. NORWALK, CONN.

PRECISION MEASUREMENT AT ANY FLOW RATE

AMERICAN-WESTCOTT A-88

ORIFICE METERS

Versatile American® Series A-88 mercury-type orifice meters meet the toughest flow measurement requirements – working pressures to 5,000 psi – interchangeable 10, 20, 50, 100 and 200-inch ranges. Recording meters may be equipped with 0-150° F. standard temperature element. Integrating meters integrate static and differential pressure, providing totalized flow indications. Telemetering equipped meters transmit integrated indications to remote locations.

- Manometer body easily cleaned – does not affect calibration.
- Tamper-proof calibration – simple, positive adjustment of float lever arm length.
- Interchangeable ranges – no manifold piping changes.
- Teflon-packed stuffing box is pressure tight, nearly frictionless, never needs lubrication.
- Teflon-packed pulsation dampener externally adjustable under full line pressure.
- Check valves give positive shut-off for over-range protection.

AMERICAN® METER COMPANY
INCORPORATED (ESTABLISHED 1874)

General Offices: Philadelphia 16, Pa.
Sales offices in principal cities

SHOWCASE . . .

New Literature

Ferrous metallurgy

. . . basic guide is available in a four-color, 8½ by 11-in. version. Recommended as a standard reference source, the guide is being offered free upon request. Principal characteristics of steels (with carbon content ranging to 0.9%) are represented across the temperature range to 2,900° F.

Shown are important working zones, including preheating for welding, stress relieving, normalizing, annealing, carburizing, and forging. At the right of the chart, 24 common metallurgical terms are defined and explained. A diagram symbolizing the change in grain size with temperature appears at the left.

The reverse side of the chart serves as a catalog page, illustrating and listing available temperature ratings for temperature-indicating materials. Source: **Tempil Corp., 132 West Twenty-second Street, New York 11.**

Dehydration

. . . schematic diagram in full color clearly shows the arrangement and operation of a mechanical filter-disposable cartridge-type purifier used for the removal of water vapor, foreign particles, oil vapor, and other contamination from air and a variety of gases at high pressure.

Equipment of this nature is widely used to clean and dry gases in plants and laboratories, in pneumatic and hydraulic-system charging, instrumentation, and purging of systems. Source: **Robbins Aviation, Inc., 2350 East Thirty-Eighth Street, Los Angeles 58.**

400 synthetic organic chemicals

. . . are described in a new 28-page physical-properties booklet, free for the asking. The publication contains information on applications, physical properties, and shipping.

Included are alcohols, acids, anhydrides, chlorine compounds, esters, ethers and oxides, glycol-ethers, glycols and triols, ketones, monomers, Carbowax polyethylene glycols, metallic salts, nitrogen compounds, cyclic compounds, Flexol plasticizers, polypropylene glycols, Ucon fluids, lubricants, and fluorocarbons, Tergitol surfactants, Polyox water-soluble resins, Cellosize hydroxyethyl cellulose, new chemicals for evaluation, and chemicals for special applications.

WELL CORROSION?

inhibitor squeeze with CORBAN

The "squeeze" method of applying Corban®—the Dowell family of corrosion inhibitors—involves pumping the inhibitor through the tubing string into the producing formation. The metal parts contacted by the Corban receive a protective film of inhibitor. As the well is produced, Corban from the formation maintains this protective film for an extended period. "Squeezing" with Corban has been especially beneficial—particularly in wells previously difficult to treat. Get an engineered recommendation from Dowell on the use of Corban.

Products for the oil industry

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

DIAL DOWELL

Source: **Union Carbide Chemicals Co., 30 East Forty-Second Street, New York 17.**

Multipointer gage units

. . . used for pressure and level measurements, and pneumatic transmitting or receiving, are described and illustrated in new, four-page Product Specification M42-2. An actual-size drawing of the 7-in. indicating scale is included to illustrate easy readability. Source: **Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10.**

Packaged compressor

. . . 300 hp., is detailed in a new 6-page bulletin now available. Bulletin 92 reviews the need for small horsepower, heavy-duty integral engine-driven compressors specifically designed for field-gathering service.

The publication discusses the power unit and compressor cylinders used in construction of the Model DM-125 compressor, along with operating characteristics. Articulated connecting-rod construction and crosshead and guide assembly are illustrated, as well as over-all dimensions. Source: **Cooper-Bessemer Corp., Mount Vernon, Ohio.**

Aerosol and dust

. . . collecting methods from ducts and stacks are outlined in an obtainable 16-page booklet—Dust Topics. It presents detailed instructions on conventional methods for evaluating dust concentrations in work areas.

Increased industrial use of potentially hazardous materials such as beryllium should make this booklet of great interest to process engineers and safety supervisors. The literature should also prove useful to firms handling radioactive compounds. Source: **Gelman Instrument Co., P. O. Box 86, Chelsea, Mich.**

PIPELINE SYSTEMS
OIL / GAS / WATER / PRODUCTS
WHERE IN TH
WORLD DO
YOU NEED
CONSTRUCTION?
WILLIAMS BROTHERS
ENGINEERS – CONSTRUCTORS
NBT BUILDING, TULSA, OKLAHOMA / CABLE: WILLBRO
NEW YORK / WASHINGTON / LOUISVILLE
MINNEAPOLIS / CARACAS / BOGOTA / LA PAZ / EDMONTON
CALGARY / LONDON / ANKARA / TEHRAN

Free coating chart

. . . compares protective-coating systems for concrete floors. It shows by columns the resistance of each system to chemicals, thermal shock, abrasion, and temperature. The chart also gives compressive strength, impact resistance, skidproof properties, thickness, and cost-per-square-foot of individual systems. Ratings of unprotected concrete are included. By reference to Chart 10, proper protection can be determined to fit specific problems within your plant. It's simple to use and easy to read. Source: **Carboline Co., 32 Hanley Industrial Court, St. Louis 17.**

Gas-injection

. . . project in Ain Dar, Saudi Arabia by Arabian American Oil Co. is being offered to interested parties in a report form, Bulletin 183. The article describes this $30,000,000 project which will gather and inject 210 M.M.c.f.d. of gas in the Ghawar field.

All details of the operation are covered including the use of five series-connected Clark gas turbines for compressor drive, plus the use of an additional turbine to drive a 5,600-kw. generator to power the gas-oil separator plants. Source: **Clark Bros. Co., Olean, N. Y.**

Demineralizer bulletin

. . . describes the Uni-Pac Model M, designed specially for process-water applications. Size of the new series mixed-bed design ranges up to 13,200 gal. per hour. Bulletin 5819 (4 pages) contains information on the use of demineralization process in eliminating variables in water and their effects on product quality control. Source: **Cochrane Corp., Seventeenth Street Below Alleghany Avenue, Philadelphia 32.**

In this **Split Wedge Gate**

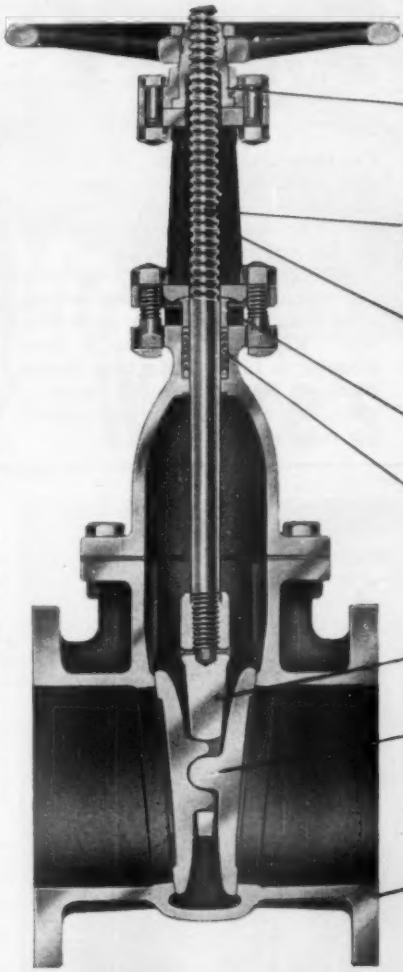
you can see why it pays to

Specify JENKINS for STAINLESS STEEL Valves, too

This picture shows the many points of excellence in the design and construction of Jenkins Fig. 1327 Split Wedge Stainless Steel Gate Valves. Compare them with any valve you know. You'll conclude that it's hard to beat Jenkins at making valves, no matter what the material.

But no picture can show the quality of the castings . . . the precision machining . . . the rigid inspection and testing that have gone into this valve. All of these are as important as design and metal alloys in assuring long, dependable, economical valve service. And, all of them are up to the peak standards for which Jenkins has been known for almost a century.

SEND FOR NEW CATALOG of Jenkins Stainless Steel Valves. You'll find in it the patterns you want, in a choice of alloys that satisfy the requirements of practically all corrosive services. Also, you'll see that these Jenkins valves meet valve industry specifications and the high standards established by the leading users of stainless steel valves. Jenkins Bros., 100 Park Avenue, New York 17.



WHEEL of high strength malleable iron designed for firm grip and easy operation.

YOKE BUSHING, easily renewable. Made of bronze, for ideal thread engagement with stainless steel spindle, to prevent seizing or galling of spindle threads. Bushing of stainless steel is optional.

SPINDLE has long thread bearing surfaces with correct lead for easy, tight closing. Screws into wedge carrier, then secured by a stainless steel pin.

YOKE BONNET has liberal space between yoke arms for easy access to packing box. Precision machined flange face assures uniform contact with gasket for a tight body-bonnet joint.

GLAND consists of two pieces — gland flange and gland follower — eliminates binding of follower in case gland bolts are tightened unevenly.

PACKING of Chevron-type Teflon in large packing box prevents leakage. Only a minimum load is required on gland, extending service life of packing.

WEDGE CARRIER connects wedge to spindle and raises or lowers it. Husky in size to stand any operating strains.

SPLIT WEDGE is the ball-and-socket design which automatically adjusts to the tapered seating surfaces for positive shutoff. The discs, revolving freely in the wedge carrier, produce a self-cleaning action on seating surfaces and reduce possibility of galling and seizing.

BODY — Through-port design for full, free flow. Ample wall thickness and good design provide extra strength to withstand stresses. End flanges conform to M.S.S. specs.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES

Sold Through Leading Distributors Everywhere

JENKINS BROS., 100 Park Avenue, New York 17, N. Y.

☐ Send the new stainless steel valve catalog

☐ Have a representative call on me

NAME & TITLE.....

COMPANY.....

ADDRESS.....

▶▶▶ Equipment Men Notes

Pierce Shannon Joins Hughes

. . . Tool Co. as manager of sales promotion, according to W. H. Siems, vice president in charge of sales. Shannon will also be assistant advertising manager, reporting to G. J. Meyer.

Shannon previously was with Foote, Cone & Belding, Advertising, in Houston, and was assigned to the Hughes account. He previously was editor of Drilling Magazine in Dallas.

H. R. Wells elected exec. veep

. . . of Milwhite Mud Sales Co., Houston. He is manager of production and properties and is director of the company. Wells formerly served as vice president of Milwhite and as vice president of Mobar Corp., formerly the production division of Milwhite. Prior to these positions, he was assistant to the chief engineer of Mississippi River Fuel Corp., Milwhite's parent company.

Oilwell names three at Calgary

. . . to fill positions as field representative, city representative, and store manager, according to W. A. Weir, Canadian area manager of the division. The field representative—William M. Wallace—has been employed by U. S. Steel Corp.'s Oil Well Supply Division since 1953.

William A. Slocombe is the new city representative at Calgary, moving from store manager at the same location. Replacing Slocombe as store manager is James F. Jenkins, former manager of the division's store at Okotoks. He has been with Oilwell for more than 11 years.

DISTRICT MANAGERS of George E. Failing Co. and other outside sales personnel of the company attended a 3-day meeting last month at the home offices in Enid, Okla. A special feature was the unveiling of a new model portable rig—the FP-3. Seated, from left, are: E. E. Martin, John McMahan, E. A. Johndrow, Robert M. Greer (Failing president), Walt Buller, Dick Miles, Bud Floyd, and Harold Holden. Middle row, from left: Charles Wilson, Everett Tingley, Charles Wolford, Burt Pedigo, Jack Felton, Ed Herbst, Carl Collins, Herb Silver, John Lamun, and H. J. Godschalk. Back row: Tor Fellbom, Joe Tracy, Jimmy Helton, Paul Eby, Wesley Page, Floyd Robinson, Russell Cowherd, Julian Stetnish, and William Ball.

H. G. Frizzell is district engineer

H. G. Frizzell

. . . at Shreveport for Dowell Division of The Dow Chemical Co., reports C. L. Power, Jr., district manager.

Frizzell joined Dowell in 1951 as a junior engineer at Shreveport and a year later, was promoted to service engineer. In 1955 he was transferred to the company's general offices in Tulsa as a development engineer. As a petroleum engineer at Shreveport the past 4 years, he has been responsible for petroleum-engineering aspects of the company's activities in the Arkansas-Louisiana-Texas area.

NEW NOMAD MEMBERS are inducted into the Los Angeles chapter during last month's meeting. Charlie King (right), of Baker Oil Tools, served as ritual master and Chili Sutton (left), of Oil Well Mfg. Co., was assistant. Between them are new members (left to right) Louis Q. Webber, Martin-Decker Corp., regular member; Robey Deem, export representative, associate member; and Glenn S. Prosser, Axelson Mfg. Co., regular member.

Hycalog, Inc. makes five

. . . promotions and three transfers.

Promotions involve: R. R. (Bob) Willis, from assistant to district manager for the well-logging division in the Oklahoma district with offices in Oklahoma City; W. H. Bradford, from well-logging unit manager to district manager of Oklahoma and Kansas with headquarters in Liberal, Kans.; F. T. Pittman, from diamond-coring engineer to sales engineer in Maracaibo, Venezuela; Jess Gilbert, from district engineer to district manager of the Oklahoma area, diamond-equipment division, with offices in Oklahoma City; and E. W. Furgason, from diamond-coring engineer to district manager for the Diamond Division at Odessa, Tex.

Frank Kruta has been employed as sales engineer in the Casper, Wyo.,

Where's the Fire?

There isn't any. This spread is using the new CORR-PREV Pipe Coating Team — CHASEKOTE and CHASEWRAP. Pipe is wrapped cold, right from the roll. No fires, fumes, heating or drying time. CORR-PREV high-speed cleaning and wrapping machines apply CHASEKOTE and CHASEWRAP to the pipe in *one* continuous operation. The result: Smaller, faster moving coating crews . . . more footage per day . . . *plus* unequalled under-ground pipe protection at *lowest applied cost!*

Chasekote*

— is a pressure-sensitive, protective tapecoating of *polyethylene*— THE pipe coating material *proved and approved* for its unsurpassed electrical, chemical, moisture and bacterial resistance. Extra-heavy adhesive mass minimizes the need for primer . . . assures fast, permanent tape-to-metal bond.

Chasewrap*

— is an abrasion-resistant, wrinkle-free overwrap that effectively shields against backfill and soil stress damage. Wraps simultaneously with tape. Superior to rag and felt wraps, yet lower in cost.

*Trade name of Chase & Sons, Inc., long-famous for protective and insulating tapes for electrical wire and cable.

The New CORR-PREV Pipe Coating Team

Try this new CORR-PREV Pipe Coating Team on your next job. You get all coating items — including high-speed wrapping machinery — from one dependable source. Each roll of CHASEKOTE and CHASEWRAP is factory-uniform in quality and thickness, to give you longer-lasting protection — *and save you money* — every time you place pipe underground! **CHASE & SONS, INC., 26 Spruce Street, North Quincy, Mass.**

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Oil & Gas Transmission Lines

(CORR-PREV DIVISION)

Highway and Airport Conduit & Pipe

Utility Distribution Systems

Chemical & Industrial Plant Piping

WHEREVER

YOU DRILL YOU'LL FIND REED "Y" BITS OUTSTANDING

Reed Y bits are doing an outstanding job because they are designed, engineered, and manufactured for one purpose—to dig a straight, full gage hole in the least possible time.

The advanced design of these bits, using special steels and precise manufacturing control, results in one of the most efficient tools on your rig.

The proof of the effectiveness of these bits is the increasing number of outstanding records we are receiving from the field. Wherever you're drilling, in the States or abroad, we can show you how Reed Y bits can help you get down the hole faster.

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WHATEVER THE SOIL AND CLIMATIC CONDITIONS you encounter in the course of pipe line construction, there is at least one Nicolet Pipe Line Wrap that will give your pipe line the best possible protection.

You can pick from either the popular #15 "Standard" or the #8 "Tufbestos". Both are Tar or Asphalt saturated Asbestos, Glass Reinforced, Perforated or Non-Perforated (#15 "Standard" is also available without Glass Reinforcement).

Or, you may need that growing favorite, Nicolet Reflecto Asbestos Pipe Line Felt. This is a strong, tough and light weight Wrap that handles easily and is economical to ship. It has built-in neoprene and is Glass Reinforced and Perforated. It is a white Wrap that is capable of reducing enamel temperatures as much as 30%.

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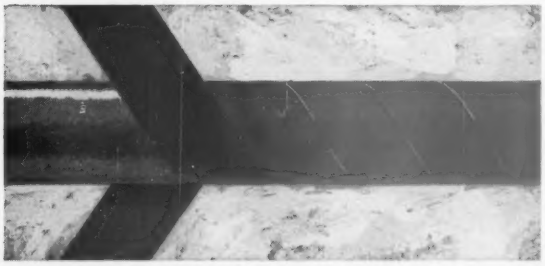
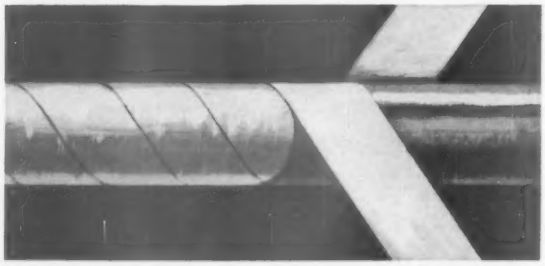




NICOLET INDUSTRIES, INC.

FLORHAM PARK, NEW JERSEY

district. He locates in Billings, Mont. Transfers involve E. V. Nesbitt who moves from South Louisiana to Oklahoma district office at Oklahoma City; and John A. Norwood, who shifts from Oklahoma to the South Louisiana district with headquarters in New Orleans.

Baash-Ross Division announces

... three personnel changes. Edgar W. Carne, Jr., has been promoted to manager of export sales and will work

E. W. Carne, Jr.

S. D. Goins

out of the company's Houston offices. Carne joined Baash-Ross Division of Joy Mfg. Co. in 1946, and during the previous 3 years has been product manager for South and Central America.

S. D. Goins has joined the division as operations manager in the company's Odessa plant. He formerly was general superintendent of Bethlehem Steel Co.'s Supply Division in Corsicana, Tex. Starting with American Well & Prospecting Co. in 1926 as a machinist, Goins worked his way up to works manager in 1944 when the company was purchased by Bethlehem Supply Co.

William F. Krause, Jr., has been transferred to the Harvey, La., office, where he will serve as Gulf Coast area sales engineer. Previously he had been Mid-Continent area sales engineer in Oklahoma City.

Sales-engineering office opened

... in Houston by Thompson-Ramo-Wooldridge Products Co. Rigdon Currie, southwestern regional sales manager, heads the office and is responsible for all sales activities in Texas, Oklahoma, Arkansas, Louisiana, and New Mexico. Prior to joining Ramo-Wooldridge in 1956, he was sales engineer for Spotswood Parker & Co. in Aalanta. He joined TRW Products at its founding in 1958.

TRW Products, a division of Thompson Ramo Wooldridge Inc., specializes in industrial process control and data handling, and markets systems incorporating the RW-300 digital-control computer. The company opened five other offices last year in New York City, Chicago, Washington, Europe, and Asia.

Franklin Supply Co. announces

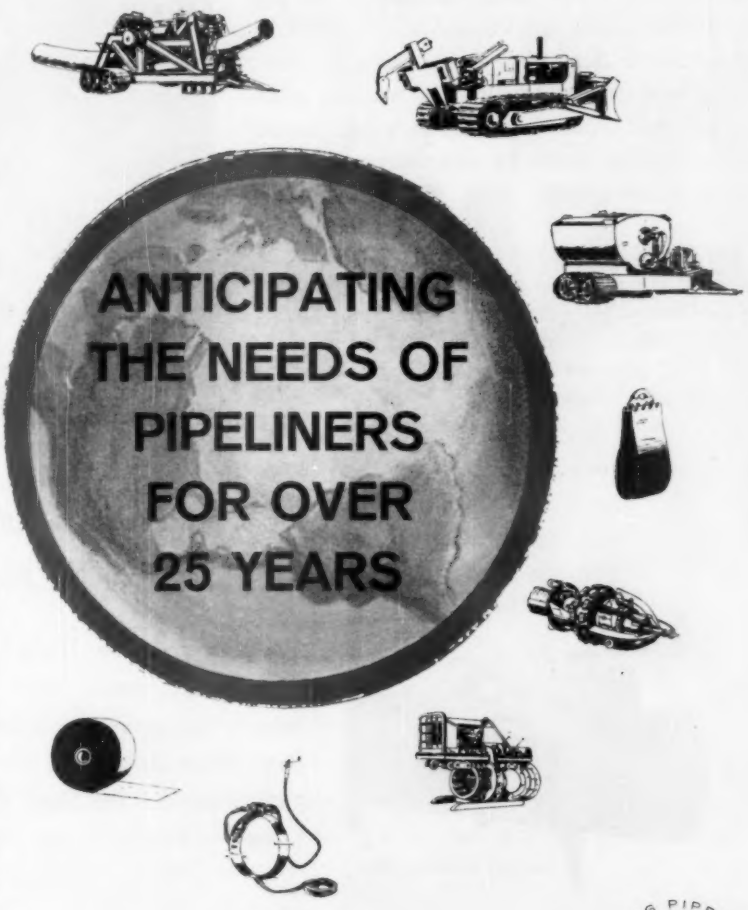
... several changes in company personnel.

Jim Blane, salesman in the New York City office, has been transferred to Denver as branch manager. After joining the firm in 1954, Blane worked as storeman, store manager, manager of purchases, and salesman in Chicago and New York, prior to this promotion.

John Russell, of the Tulsa office, has also been transferred to Denver as a city salesman. With Franklin since 1956, he has worked as manager of purchases and salesman in various branches in Oklahoma, Louisiana, and Texas. Russell replaces Maurice (Bud) Walters, Jr., who has been moved to New York City as city salesman. Walters has been with Franklin 5 years, starting as storeman in the Mt. Pleasant, Mich. store.

Also announced was the transfer of Louis Rotor to Maracaibo, Venezuela, as manager of stores for the firm's Petricon Division. Rotor joined the firm in 1954 as store manager in Odessa. His most recent assignment was as store manager at Liberal, Kans.

Lee Croger is the new manager of purchases and inside sales at the East Chicago store. With Franklin for 11 years, Croger started as storeman in



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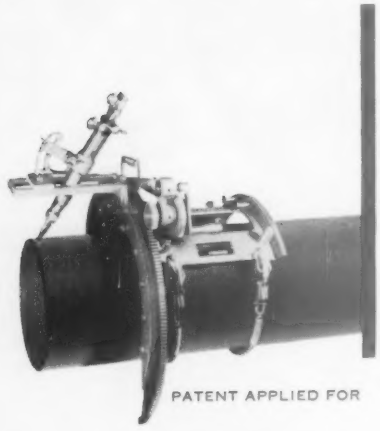
In Canada: Canadian Equipment Sales & Service Co., Ltd., 7310 99th St., Edmonton, Alberta, Canada

Atlas Pipe uses new H&M "BEVEL-LAND" GRINDER to recondition 4000 joints of 10-inch pipe

Atlas Pipe, Inc., of Houston was faced with the problem of reconditioning several ships' cargoes of pipe to be used on the Transwestern pipeline. Most of the pipe had badly dented ends that required severing a 2" to 4" strip and placing a new bevel and land on the pipe end. The H&M "BEVEL-LAND" GRINDER was used to clean up the pipe cuts and place a new land on the bevels. The machine eliminated time-consuming handwork and insured better quality welds by accurately placing the land on the bevel.

The new H&M "BEVEL-LAND" GRINDER uses an electric or air powered grinder to clean pipe cuts and place the land on pipe bevels. The GRINDER is available in two models — one for 6-12" pipe and one for 14-30" pipe. Larger models are available on request.

PATENT NO. 2,869,293



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for profitable pipe cutting and beveling H&M STANDARD MACHINES & ACCESSORIES

The seven models of H&M Pipe Cutting and Beveling Machines are designed to handle 1½" through 36" pipe. Lightweight and rugged, they give dependable performance — in the field or in the shop. H&M Accessories offer you complete pipe cutting efficiency and include — the Shape Cutter — Out-of-Round — Motorized Units — Flexible Shaft — Pipe Dollies — Boxes — Clamps.

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PIPE BEVELING MACHINE CO.

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TULSA, OKLAHOMA

Grayville, Ill., and for the past 5 years has been store manager at Harvey, La.

J&L Supply Division appoints

. . . three new store managers, according to A. G. Bastian, manager of field operations.

F. W. Bryan takes over as store manager at Mexia, Tex. He formerly was a salesman there. J. L. Brown, salesman at Longview, Tex., assumes

F. W. Bryan

J. L. Brown

the store-manager post at the same locale. R. A. Stearns, storeman at Borger, Tex., has been promoted to store manager and assigned to Best, Tex.

Bryan joined Jones & Laughlin as a storeman at Mexia in 1942. He was promoted to salesman there in 1954. Brown began his career with J&L as a storeman at Seminole, Okla. 12 years ago. He later served as store manager at Gladewater, Tex., and in 1956 became a salesman there. Stearns was first associated with J&L at Borger as a storeman in 1952.

General Controls Co. announces

. . . that new representatives have joined the company in Los Angeles and Kansas City.

R. Porter Fay takes over as an Industrial Controls Division field representative in the firm's Los Angeles sales office. He comes from Energy Control, Inc., Philadelphia, where he was sales and applications engineer. Fay now will sell and service industrial controls, including Hydramotors, Tork-Master electric-valve operators, and Hammel-Dahl valves.

Wilburn K. Robinson is the new regional representative for the Industrial Controls Division in the Kansas City area. He is in charge of sales and service of the company's industrial valves, PIC counters, draft controls, valves, and flow tubes manufactured by G-C's Hammel-Dahl and Foster Engineering Divisions. Robinson was formerly a sales engineer with Minneapolis-Honeywell Regulator Co. in Kansas City. He was also an administrative assistant in Ford Motor Co.'s Aircraft Division at Claycomo, Mo.

Frank W. Taylor is sales agent

. . . for Tubular Products Division of Babcock & Wilcox Co., announces Leon B. Wohlgemuth, the division's general sales manager. Taylor will handle sales of seamless and welded tubing, welding fittings, and flanges on an exclusive basis in Colorado, Wyoming, and Montana.

Mass sales meeting is held

. . . by Walworth Co. in Rockton, Ill. The company's first such sales meeting—called Wal-rama—was under the direction of Harold Brown, vice president and general sales manager. Attending were 110 salesmen, division and plant managers, research and engineering directors, and general office executives. The 3-day meeting placed particular emphasis on product knowledge.

Goff appointed sales engineer

. . . at the Houston office of Cooper-Bessemer Corp., announces George Edick, domestic sales manager. In this post, David K. Goff will work under the supervision of Earl P. Martin, Houston branch manager, on the application and sale of C-B compressors and engines in that area. Goff has been assigned to the sales department

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. . . that makes the difference. The **spread** between a first class job and a mediocre one is simply this . . . the **spread** between close attention to details and a slip-shod operation.

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• Leland's versatile truck bodies deliver maximum pay loads at minimum initial and maintenance costs. For full information contact: Leland Equipment Company, 408 No. Main, Tulsa, Oklahoma, or either of the offices listed below.

Leland also offers you parts and service on such famous name equipment as . . . Cleveland Trenchers . . . Thew-Lorain . . . Gardner Denver . . . C. M. C. . . . Blaw Knox . . . Cedarapids . . . Bros Road Machinery . . . and Tulsa Winches.

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Leland

EQUIPMENT COMPANY

Oklahoma City • TULSA • Longview, Texas

at the company's headquarters in Mount Vernon, Ohio since 1957.

Paul Gotley is general manager

. . . of Equipment & Services, Ltd., Harlow, Essex, England, reports J. K. Chuchla, managing director. The firm manufactures automatic electrical timing and control equipment.

The organization recently began a special quick-delivery service of electrical timing and control products, manufactured to specific requirements of individual customers. This is done through a special manufacturing section and delivery team.

Lee Grimm new sales manager

. . . of the Western Division of Granberg Corp., subsidiary of American Meter Co., Inc., reports R. C. Anderson, vice president of operations.

Lee Grimm

Grimm began with Granberg in 1950 as salesman in the Northern California area, and in 1953 opened the company's Los Angeles sales office. He left the company for a 3-year period, and now returns to take over the sales and service operations in the Pacific Coast states.

Strato Drill, Inc. is formed

. . . in Houston to manufacture a new rig and develop equipment and practices in a new approach to drilling for petroleum and minerals, reports Howard Rhodes, president.

The new rig takes a continuous core from grass roots to the full depth of the hole using reverse circulation in conjunction with a core bit and a dual drill-pipe string which is rotated by a power swivel. Cores with 2-in. diameters and 6-in. lengths are circulated to the surface through the core tube and onto a shale shaker where they are retrieved and placed in trays.

Rhodes is one of the founders of Longhorn Machine Works, and was president until he sold the company in 1954, at which time he retired. Homer Henderson, who developed the method and equipment, is chief engineer of the new firm.

Plastic Applicators, Inc. plans

. . . to spend more than $200,000 on expansion during the first part of

SHORT COMPACT RUGGED

GUIBERSON'S SHORTY TENSION PACKER *for* WATER FLOODING

Here is a rugged, low-cost retrievable tension packer that's short and easy to handle. Uncomplicated and functional in design, it's easy to set, space out and spot . . tension set by pulling on tubing string. And Guiberson's shorty tension packer is priced to cut your costs . . designed especially for water flood injection wells.

SAFETY JOINT COUPLING: right hand release 8 round thread for added safety.
ANCHOR CAGE: one piece malleable iron.
MANDREL: full opening heavy one piece seamless steel tubing.
LATCH: dependable J-slot mechanism, shock-absorber equipped, independent of safety joint operation.
FRICTION PADS: heat-treated pearlitic malleable iron.
SLIPS: heat-treated alloy steel.
HEADS: drillable cast iron.
RUBBER: specially compounded to withstand the most rugged oilfield use at high pressures and temperatures—built-in ability to return to original shape.
THIMBLE: drillable cast iron.
SAFETY RELEASE NUT: predetermined tension load at packer strips out, leaving safety nut, thimble, rubber and head—all drillable.

Sold by Oil Field Supply Stores Everywhere

SAFE THAN SORRY
GUIBERSON
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THE
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CORPORATION

ESTABLISHED 1919

DALLAS, TEXAS U. S. A.

1960, anonunces Cordell Garner, vice president in charge of sales. The report comes just as Plastic Applicators is completing a $400,000 expansion program started during 1959. The firm has also acquired Pipe Inspectors, Inc., of Harvey, La. It's name will be changed to Pipe Inspectors.

Included in the 1960 first-quarter expansion program, along with consolidation and enlargement of laboratory facilities, are the construction of a Houston Division headquarters building, construction of a new plant building, and modernization of existing plant facilities for the Houston Division.

Lamb appointed sales engineer ... for Merla Tool Corp., Dallas-based oil tool and equipment manufacturer. A mechanical engineering graduate of SMU, Paul Lamb has been a staff engineer with Merla for 5 years.

Bovaird Supply Co. conducts ... a special day-long sales meeting in Tulsa. A series of short courses in selling practices was conducted by R. E. Batchelor, vice president and general manager; W. J. Bovaird, vice president of sales who presided; T. C. McCuistion, general sales manager; and T. H. Trower, secretary-treasurer.

The meeting was attended by all officers and Tulsa representatives plus out-of-town city salesmen and district managers representing the 27 Bovaird offices and stores in 7 states. Following the meeting, a banquet was held at which 10 employes were presented service awards.

Garrett Oil Tools announces ... a series of organizational changes, according to Taylor Milton, president of the Dresser division. D. E. Whittenberg, vice president—sales, is assuming broader responsibilities. He will be in charge of executive-office customer relations and will assist Milton with the division's administration. He will also serve as general manager in the absence of the president. Whittenberg has been with Garrett since its founding in 1946. Prior to that time he was with Guiberson Corp. and Sun Oil Co. He will maintain his office in the division's headquarters in Longview, Tex.

D. E. Whittenberg

Robert E. Dunn has been named manager of marketing, in which post he will be responsible for supervising

R. E. Dunn

J. T. Conner

and directing the sales department. He comes to Garrett from Cardwell Mfg. Co. in Wichita, where he was assistant general sales manager. Previously he was with Mid-Continent Supply Co. where he was district sales manager for Kansas, Nebraska, and the Texas Panhandle.

J. T. Conner, who has served as Garrett's South Louisiana district manager for several years, has been promoted to field sales manager. He will supervise all sales districts, including Garrett Oil Tools, Ltd. (Canada), and domestic sales agents. Conner will move to the Longview headquarters.

Another new position—manager of sales training—will be filled by R. V. McAfee. He has been with the firm since 1950 and will continue to locate at the Houston office. C. G. Phillips, sales engineer in the South Louisiana district, will supervise that district temporarily.

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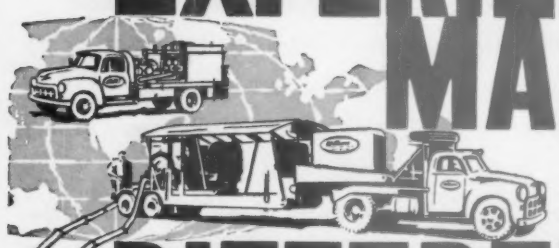
EXPERIENCE MAKES THE DIFFERENCE



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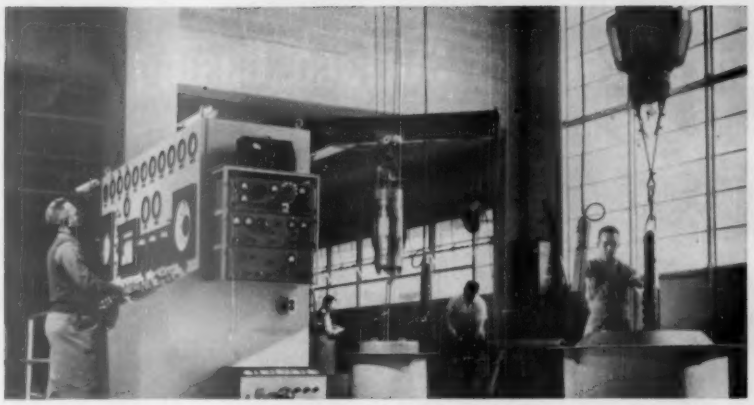

Lab preps for drilling of 50,000-ft. well

SIDEWALL SAMPLING TOOL (hanging from the huge breech-block head), is lowered into a new high-pressure, high-temperature chamber for testing under bottom-hole conditions equal to those in the deepest wells being drilled today. The 78,000-lb. pressure vessel of Schlumberger Well Surveying Corp. has a working pressure of 30,000 psi. at 450° F.

Its 12-in. i.d. and 25-ft. working length can accommodate Schlumberger's largest tools together with targets necessary for testing perforating or sampling guns. As many as 13 electrical connections can be made to the tool in the chamber through insulated conductors installed in the head. The vessel is heated by circulating superheated steam through grooves running between inner and outer shells of the chamber walls. The extremely high pressures are obtained by air-driven, plunger-type pumps.

The pumps, steam generator, cooling mechanism, dump valves, and other components, all located in a pit below the steel flooring, are operated from the console panel at the left. The system includes a number of safety devices, all connected into the control panel, to give both audio and visual alarms should any part of the equipment misfunction.

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The Oil and Gas Journal
Box 1260 Tulsa, Okla.

Midwestern announces four design changes in LITTLE BOOMER PIPELAYER

1. NO LOAD-LINE CREEPAGE— new anti-reverse design of winch gears eliminates creepage . . . assures positive control.
2. AUTOMATIC BOOM TRAVEL STOP — built-in switch bypasses hydraulic fluid when boom reaches upper limit . . . prevents bending boom over tractor.
3. STREAMLINED MAIN FRAME — redesigned main frame is stronger, more compact . . . tailored to fit each individual tractor.
4. NEW COUNTERWEIGHT CASTINGS — counterweights are more effectively positioned for better balancing . . . more lifting power. Available from 1000# through 2400#.

Midwestern's Little Boomer also features the exclusive double-drum winch arrangement which places both winches side-by-side and in full view of the operator at all times. The Little Boomer is available for crawler and wheel tractors built by CATERPILLAR, J. I. CASE, JOHN DEERE, FORD MOTOR CO., INTERNATIONAL HARVESTER and OLIVER CORPORATION. Midwestern's angle back fill blades and hydraulic tail-end winches are available as attachments for the above tractors.

LITTLE BOOMER OFFERS MANY ADVANTAGES TO PIPELINE CONTRACTORS — UTILITY COMPANIES
• Low Initial Cost • Low Operating Cost • Low Maintenance Cost • Simple, 2-Lever Control • Safety-Absolute Control of Load at all times

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Naylor Lockseam Spiralweld Surface Casing offers

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The Lockseam Spiralweld structure of Naylor surface casing provides greater strength—under pressure, compression and beam load—than any other iron or steel pipe of the same nominal wall thickness. The Lockseam carries the load, thus relieving the weld of any stress; the weld being principally a seal. The spiral helps to centralize Naylor casing in the hole . . . provides a "breathing space" . . . insures a better cementing job. For details on applications, specifications and test data, contact your nearest Mid-Continent representative.

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RAPID TRANSIT is the purpose of this helicopter which will be used to transport personnel to offshore drilling sites.

Contractor to use helicopter for offshore transportation

A TULSA CONTRACT DRILLING FIRM, Reading & Bates, has bought a Bell 47G-2 Trooper helicopter for use in its offshore work.

The ship is based at Lake Charles, La., and will transport the company's supervisory personnel to and from rigs and drilling tenders in the Gulf Coast area.

The helicopter was picked up recently at Bell Helicopter Corp.'s Fort Worth headquarters by Pilot Roy Senior and J. W. Bates, Jr., president of Reading & Bates.

The 47G-2, which sells for $40,500 without optional equipment, is a three-place model with a range of more than 200 miles, top speed above 100 m.p.h., and operating ceiling above 15,000 ft.

New Denver basin drilling program begins

IN THE western Nebraska and eastern Colorado sectors of the Denver-Julesburg basin, Falcon Seaboard Drilling Co., Tulsa, and associates announced recently the completion of the first well in an extensive drilling program.

The well—1 Singleton Heirs, NE NW 29-17n-53w, in the Singleton field of Banner County — was in pumping 200 bbl. of oil a day after recovering load from fractured perforations in the J-A3 sand, perforated at 5,531-35 ft. Total depth is 6,440 ft., with casing run to 5,613.

Company officials said that several wells are planned by Falcon Seaboard and associates during the next 15 to 16 months. Indications are that at least 20, or possibly as many as 40 wells, may be drilled.

Falcon Seaboard will be operator of the wells.

In a departure from its normal operations, the company will probably contract most of the drilling to other firms in the Denver-Julesburg area since none of its rigs are there.

Falcon Seaboard has 28 active rigs in the United States, drilling in Oklahoma, Texas, Louisiana, Kansas, and other areas of the Mid-Continent. It also has 9 operating in Venezuela.

Also in the Denver-Julesburg basin, Falcon Seaboard has completed a well south of the Adena pool of Morgan County, Colorado, which is not part of the present program there.

Its 1 State, C NE NE 36-1n-58w, was pumping 100 bbl. of oil a day from the J sand, perforated at 5,739-45 ft. The well was not treated or

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POSITIVE EXPANDING
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Quicker! Stronger! Use Grip-Tite Expanding Anchors for "Dead Men That Hold!" Use for portable drilling mast, well servicing mast, pulling truck, floor blocks, derrick guy wires.
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Grip-Tite Anchors have fail-safe construction, with positive lock-open expansion. Made of long lived certified malleable iron. All rods have 3" I.D. Eye.
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SPECIFY
500 TON for
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Protects more tool joint threads than any other compound!

Sold ONLY through supply stores

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USE JIMMIE GRAY DOPE BRUSHES

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acidized. Total depth was 5,814 ft. with 5½-in. run to a foot off bottom.

California well tested uphole

AFTER drilling to 2,900 ft. in the Beach, Church & Bell 1-25 South Lake Farms effort in Trico Northwest gas field area, the operator decided to test uphole in the Pleistocene-Tulare gas sand.

Instead of using conventional casing, 2-in. tubing was run to 940 ft. by the Bakersfield firm. After cementing at that depth, four perforations were made in the tubing. The well came in for an estimated 50 M.c.f.d. of gas which is not a very large flow—but the completion costs were small, too.

The gas well spots in NE 25-23s-21e, Kings County, in Central California, approximately 1½ miles northwest of Trico Northwest gas field. Contractor was Newton Drilling Co., Coalinga, Calif.

Montana slated for three test wells

AN AGREEMENT has been made between Union Oil Co. of California and Great Northern Drilling Co. Inc., to drill three prospects in northwestern Montana. L. P. Anderson, president of Great Northern, Billings, and W. L. Stanton, Rocky Mountain division manager of Union in Denver, made the announcement.

The first test will be drilled in the Disturbed Belt between Glacier National Park and Browning, Mont., and is scheduled to begin before June 30, 1960. Union tested the general area in 1955 with a 9,600-ft. well — its Morning Gun—that flowed 6 M.M.c.f. of gas and over 50 bbl. of high-gravity oil daily from the Madison limestone. This venture was on the Blackfeet Indian Reservation.

In addition to the Two Medicine-Morning Gun prospect are the Running Owl and Duckhead areas which are along the Disturbed Belt geologic province. The combined tracts approximate 25,000 acres.

This portion of Montana is gaining in popularity as a potentially great gas-producing region. Demand for natural gas is increasing and a favorable price structure should accelerate exploration activity.

Close cooperation between the representatives of the Blackfeet Indian Nation and Great Northern is expected to result in an equitable drilling unitization program.

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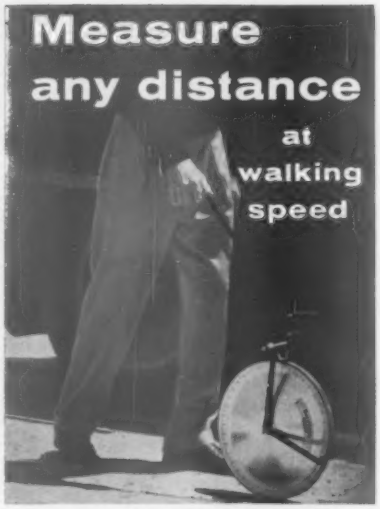

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From the start, you get faster drilling, too—more feet of hole per dollar invested. Mud gets into top condition fast, and stays that way. You eliminate long, costly waiting. When you need to, you can heavy up mud *in seconds.* Weight and gel additions disperse as fast as you dump them in.

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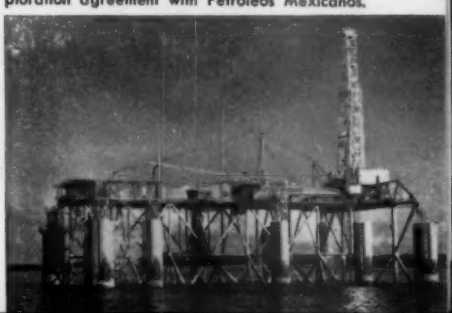
EXPLORING Mexico's first offshore field, "El Dorado" barge is being operated by Perforaciones de Mexico, S.A., drilling contractors, for Pauley Pan American Petroleum Co., under exploration agreement with Petroleos Mexicanos.



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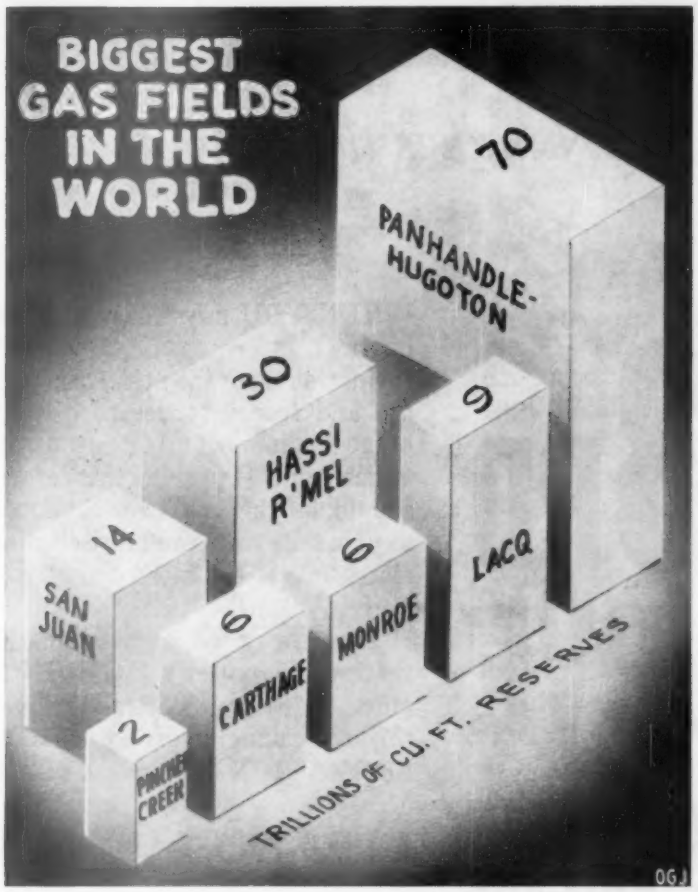

Natural gas is following oil across the seas

By FRANK J. GARDNER

BONING UP on the history of natural gas can be a revealing pastime. In view of its great and growing importance to our 1960 economy, it's distressing to read of the vast amounts of gas that went to waste in the early days of the oil industry.

The classic work "Geology of Natural Gas," published by the American Association of Petroleum Geologists in 1935, is replete with such phrases as "... the balance of production is wasted for lack of markets," "... the wastage was enormous," and "... of the total quantity of gas produced ... 60% was legitimately consumed and 40% wasted."

Gas lures drilling . . . Can you imagine an operator today wasting 40% of his gas production? Hardly. In some regions, gas has replaced oil as the chief target of the drilling crew. The rapid increase in demand, plus the improved technology of pipelining it to markets far removed from the source, has "whooshed" natural gas to the top of the list of exploration prizes. The search for it has revitalized some long-neglected theaters of early operations, such as Ontario, Ohio, Pennsylvania, and West Virginia. Underdeveloped basins, known to contain large gas reservoirs but thought to be unattractive from an outlet standpoint, have surged forward as the most active in the country . . . witness Green River, San Juan, Anadarko.

Despite this revival of interest in gas exploration, we cannot point to a single giant gas field (one whose principal product is dry gas and whose reserves exceed 600 billion cubic feet) discovered in the United States in recent years. Western Canada, of course, has done very well in this department. But the hundreds of smaller gas fields that are being found combine to keep our gas reserves "in the black" and ahead of production.

But giants are scarce . . . In the first comprehensive study of the success of gas exploration in this country, Dr. Frederic H. Lahee found (OGJ, Aug. 4, 1958, p. 97) that during the 10-year period 1943 through 1952, only 31 gas fields with reserves in excess of 300 billion cubic feet were discovered.

All of this points to a very significant fact: the bulk of our natural-gas reserves is concentrated in a mighty few spots. The diagram on this page brings it out clearly, and compares our big-field position with that of some foreign lands.

Our greatest gas field is, of course, the Panhandle-Hugoton, with total ultimate reserve tabbed at 70 trillion cubic feet. Second in line is San Juan-Blanco field with 14 trillion. And third and fourth position is a tie between Carthage and Monroe with 6 trillion each.

It's interesting to compare these statistics with those of three foreign areas. The big Hassi R'Mel field of North Central Algeria now carries a 30-trillion tag, to make it the second-largest in the world, and only eight gas wells have been finished; the field covers 2,000 sq. miles. Before they're through developing this giant, the French may have something to rival Panhandle-Hugoton.

In metropolitan France, the great Lacq gas field is estimated at 9 trillion cubic feet., which would make it the fourth-largest deposit in the world. This field exceeds 10,000 acres in area.

Western Canada, with its many large gas fields, has only a couple that can rival these giants of the U. S. and France. Hassi R'Mel reserves exceed the reserve estimate for all of Canada. Pincher Creek, with 1.8 to 2 trillion cubic feet, still stands as the Canadian champ.

The thought-clincher involved in this gas reverie is this: our big U. S. fields are old ones, for the most part, and the reserve figures cited here are ultimate, not remaining. We have used up a hefty portion of the Panhandle, Carthage, and Monroe. The foreign fields, on the other hand, are brand new by comparison. Question: Will the center of gravity in gas swing to the Eastern Hemisphere along with that of oil?

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What is exploration's role in the new petroleum era?

R. E. Sloan

. . . western area manager for Humble Oil & Refining Co., Carter Division, Denver, was graduated from the University of Oklahoma in 1933 with a BS degree in geological engineering. He was employed as a geologist by Carter Oil Co. in 1934 and did geological work in Colorado, Kansas, Illinois, Montana, and the Tulsa headquarters office before being named the company's exploration manager at Billings, Mont., in 1946. The following year he was transferred to Denver as exploration manager of Carter's western operations. He has been western area manager since 1955.

Sloan is a member of AAPG, RMAPG, and has been prominent in the Rocky Mountain API regional activities. He is a member of the executive committee of the Rocky Mountain Oil and Gas Association and serves as chairman of its depletion committee.

Sloan, well qualified by his background in exploration, poses this question:

"How do we account for the fact that the petroleum industry is in the doldrums—especially domestic producers? The tell-tale signs of this condition are obvious on every side, in restricted allowables in proration states, declining crude-oil prices, early retirements, unemployment among our technical people, and finally—in that very sensitive barometer—the stock market.

"What can we—as explorationists—do to increase the efficiency of the industry?"

THE PAST 3 YEARS have not been a satisfactory period for the oil industry as a whole. This has been true with respect to both the domestic industry and the so-called international oils. In spite of energy consumption in the free world reaching a new all-time peak during the past 18 months, the net earnings for most oil companies declined sharply in 1958 and have not bounced back as in other industries in 1959. With this background, it is appropriate that we take a critical look at the future of our industry. What are our prospects and how do they fit into the national scene?

The United States has not reached the moon, but Wall Street's bull market has continued its celestial climb. By the start of 1959, the U. S. economy had turned the corner of the nation's latest business recession, leaving behind fewer scars than ever before experienced in a similar period. This year's substantial increase in corporate earnings symbolizes the new economic power and stability of the United States.

Upsurge of Business

The upsurge of business activity in 1960 is predicted to herald a decade of economic growth greater than any we have ever realized. Employment will reach a new high. Our gross national product in 1960—the sum total of goods and services—will surpass the $500 billion mark for the first time. America's capitalism will continue to change, grow, and respond to meet the vast, ever-increasing needs of the population it serves so well.

It must do this if it is to meet the demands of an American population that will increase to 210 million people by 1970. In 25 years, our industrial capacity will probably be doubled, with 35 to 40 million new jobs created. Our energy demands, during those years, can be expected to treble.

What Does it Mean?

What does this tremendous expansion in energy requirements mean to the oil industry? Free-world demand for petroleum products has grown at an annual rate of 8% during the post-war years and is estimated to grow at a rate of 5 to 6% during the next 5 years. Domestic demand is increasing at a somewhat lower rate, but should reach 4% annually by the end of the 5-year period.

In spite of increasing competition from natural gas, particularly in the home-heating field, and the potential of such energy sources as the atom, oil will certainly maintain its nearly 50% present share of the new energy market for the foreseeable future. Petrochemicals are taking an ever-increasing share of crude oil, and we may expect petroleum to play an important role in providing fuel for space travel.

How, then, do we account for the fact that the petroleum industry is in the doldrums—especially domestic producers? The tell-tale signs of this condition are obvious on every side, in restricted allowables in proration states, declining crude-oil prices, early retirements, unemployment among our technical people, and finally—in that very sensitive barometer—the stock market. A recent study to determine the reason for declining oil-industry stock price reveals that the oil industry showed a 25% decline in earnings during the recent recession, compared with only a 16% decline for a composite of other industries. Obviously our present infirmity did not come as a bolt out of the sky, but the result of a number of circumstances which have developed over the past several years.

Rebuilding Europe

To go back briefly, at the end of World War II in 1945, there was an extraordinary surge in oil use that accompanied the rebuilding of a war-

Presented before Rocky Mountain Association of Geologists, December 18, 1959.

devastated Europe. Demand and production set new records each year during the decade following the war. Producing capacity was substantially increased to meet the needs of a growing world. During this period the margin of capacity over demand was only that necessary for flexible operations.

An interruption of the long-term growth rate began in 1957. During the past 3 years, demand has increased at a lower rate due to an easing off of European demands, competition from other fuels, and improved efficiency in uses of oil.

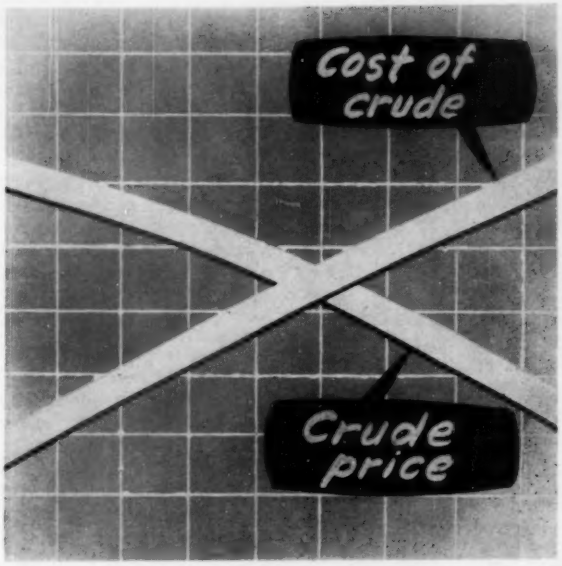
The supply side of the picture has also changed significantly since the close of the war. Western Canada's production has jumped from near zero to approximately 1,000,000 bbl. per day. Prolific pools have been proved in Venezuela and recent discoveries in Algeria and Libya indicate a new and major source of petroleum for that part of the world. Our Rocky Mountain region has developed substantial reserves in the Williston basin, Wyoming, the Denver basin, and the Four Corners area.

Conserve Exchange

To conserve monetary exchange and to meet nationalistic demands, many new refineries have been constructed in free-world countries. Of these, several duplicated existing facilities and have brought about surplus capacity and a disruption of markets. Even in transportation the replacement of World War II tankers with the more economic super vessels having three to five times greater capacity has resulted in the equivalent of over 450 T-2 tankers being tied up in ports around the world.

These factors have been major contributors to a very competitive price situation in world markets.

Here at home, the turning point occurred at the time of the Suez crisis. In the middle fifties, the increasing replacement cost of crude with no increase in domestic crude prices was putting producers of newly discovered oil in a critical profit squeeze. A price increase was believed by many to be long overdue when the Suez canal was closed on October 31, 1956, thereby disrupting the normal movement of Middle-East crude to Europe. This resulted in a sudden increased demand for crude from the United States. To stimulate production of Gulf Coast oil, price increases of 25 to 45 cents per barrel were posted. Increases in the order of 25 cents per barrel were soon announced in most of the other domestic producing areas. A taste of things to come was indicated, however, by an almost immediate round of price reductions when the canal was reopened in the spring of 1957. This was the beginning of a gradual erosion of prices which has continued to the present. In our own area, you will recall the 10-cent reduction on Denver basin crude in July 1958 and the additional 5 cents per barrel in December of that year. Reductions have been even more drastic in the Four Corners area. Readjustments there as recently as September of this year have reduced the price from the original posting of $3.15 per barrel in November 1957 to the present $2.75.



". . . the law of supply and demand . . ."

Excess in Capacity

The excess in domestic producing capacity over demand has reduced allowables in the proration states to new all-time lows and forced the recent federal restrictions on imports of foreign oil and products.

While the law of supply and demand has ardently been at work reducing the oil producers' income, the cost of replacing each barrel of crude produced has progressively risen. Our economists tell us that in the Mid-Continent-Rocky Mountain area it has cost industry an average of $2.47 to find, develop, and produce a barrel of crude oil during the 5-year period 1954-1958. The average crude price

". . . petroleum plays an important role . . ."

during this same period was $2.82 a barrel. Obviously a continuation of this trend leads to the break-even point and then to a loss.

We all know the reasons for the increasing costs. Oil is getting progressively harder to find. The use of more complex and expensive exploration techniques, rising material costs and frequent general wage increases coupled with a decline in barrels discovered per wildcat drilled has led to the inevitable.

Needless to say, industry leaders have not sat idly by while this serious situation was developing. Steps have been taken to reduce expenses, decrease capital outlays, and increase general efficiency. The wave of combining the areas of exploration and producing offices and the consolidation of companies are the result of efforts to operate more efficiently.

Rewarding Efforts

One of the more rewarding efforts of cost reduction in the industry has been the recent trend toward miniaturization of drilling and producing equipment. A good example of this is a recent 14-well wildcat program by Carter in the Four Corners area. The use of smaller rigs and reduction of hole size from 9 in. to 6¾ or 7⅞ in. resulted in an over-all saving of nearly $100,000.

Even larger savings are anticipated in another such program now under way by close attention to improved rig hydraulics. Savings in the completion of producing wells are being made through the use of smaller casing and in the so-called "tubingless" completion. The use of materials with less strength and therefore greater economic risk has required more faith from management that our field people can handle the new situations which are bound to arise.

An alert industry has been quick to adapt to new techniques such as formation fracturing, sonic logging, and magnetic tape recording of seismic records. These and many other recent developments are helping us to do our jobs better and more efficiently.

Another Approach

Another approach to cost saving has been the use of wider well spacing resulting in lower development costs per barrel of reserves. Much of this is possible because of the willingness of many operators to support the more advanced concepts of good engineering practice.

Wasteful duplication of effort has cost the oil industry millions of dollars over the years. A breakthrough on this front can be seen in the introduction of commercial-well record services, cooperative geophysical programs, sample services, unitized operations, and many others.

On the legislative front, an enlightened industry has supported conservation laws in many states which promote the more efficient use of our natural resources. Oil people have also done much in recent years to dispel adverse public opinion through activities in civic, educational, and charitable enterprises. These activities certainly result in a healthier business climate for the industry.

Obviously this picture of the ills and attempted remedies of the oil industry has been painted with a broad brush. To forestall erroneous conclusions, it is appropriate that I state categorically at this point that in my opinion we are not running out of oil in the foreseeable future.

Present Reserves

Our present crude-oil reserves, conservatively estimated by the API at 30.5 billion barrels, will undoubtedly be substantially increased as a result of additional development, upward revisions, and secondary-recovery operations. Further, you are well aware that despite the elusiveness of new pools, there are many billions of barrels yet to be discovered in the Rocky Mountain region and elsewhere within our borders.

Belatedly we come to the crux of this discussion. What can we, as individuals—as explorationists—do to increase the efficiency of the industry? With the realization that a crude-price increase is not in the offing and knowing that material and labor costs will undoubtedly increase in the years ahead, how can we as geologists and geophysicists widen the narrowing gap between cost of replacement and the sale price of crude oil?

Lower Costs

The answer is obvious—we must lower the cost of finding and producing. To do this there are two broad fields of activity we must consider. First we must lend our support at every turn to the efforts of those in our industry who are seeking to reduce costs of operation and improve public relations. This includes supporting such cost-cutting programs as wider well spacing, well-record services, improved producing practices, and increased drilling efficiency.

On the political front we must maintain constant vigilance in answering critics who propose the weakening of the percentage-depletion provision. The inherent risks of our industry coupled with the ever-increasing energy demands of our country make this stimulus more vital than ever. Within our industry we must put aside petty jealousies, sharp business practices, and excessive producing rates to support conservation practices designed to obtain maximum recovery from our reserves.

Second, and most important, we must each critically examine our own contribution to the over-all objective—the finding and producing of crude-oil and gas reserves. How often have you heard a geologist or geophysicist say, "I'm no supervisor, or manager, I'm a technical man—a scientist." Just as reading is not thinking, the scientific efforts of many hardworking geologists and geophysicists are

"... another approach to cost saving ..."

not necessarily contributing to the finding of oil or gas.

To contribute effectively you must have, in addition to scientific ability, imagination, curiosity, determination, and leadership. You must be a manager, whether it be of your own time and ability, or a manager of men, money, and materials. You must have insight and analytical ability to appraise situations and recognize what is important. You must exercise good judgment and have the desire to excel. You must seek responsibility and have the determination and strength of character to follow through and accomplish an objective.

It is certain that each of you has recognized himself. Seriously though, how many times have we gone along with a plan to use an expensive tool such as the seismograph when we have known that basic work by surface geologists or regional subsurface studies remained to be done? How often have our geophysical people agreed to undertake an expensive program with no specific objective in mind? How many times have we battered our heads against a wall spending our energies and money in areas which no longer justified more than the minimum of observation? It is vital that we evaluate our areas better both geologically and economically. We must spend every minute and every penny on the area that we honestly believe to be the more prospective.

Upgrade Thinking

We must upgrade our geologic thinking. We must not use expensive exploration methods in new areas before we have digested the data already available to use or which can be obtained by a few visits to the outcrops. We must make the fullest use possible of gravity and magnetic surveys, of surface mapping, of photogeology, of sample studies, and above all, of our past experience and creative abilities before we recommend expensive exploration programs. At the same time we must be willing to try new techniques and listen with open minds to new ideas and concepts. No one would say the oil industry is a conservative lot, yet how we explorationists do resist new ideas because they make us think or disrupt our comfortable patterns of operation!

We are members of a young, vital, and growing industry reaching out to the frontiers of a new age. It is the nature of frontiers to be dangerous, but who would want it otherwise? For where there are great dangers, there are also great opportunities. Gentlemen, the technical men of our country must be the leaders in seizing on those opportunities. Your future can be unlimited.

HERE IS the significant Lookout Butte gas-condensate discovery, 7 miles southeast of Pincher Creek field, Alberta. Open flow of 31 M.M.c.f.d. is reported at the well which is the southernmost projection of the prolific Foothills belt producing trend along the Rocky Mountains in Canada.

Alberta's Lookout Butte extends gas farther south

ONE OF ALBERTA'S highly publicized gas-condensate discoveries of 1959 now has a bit of 1960 success flavor to it. It is British American Oil Co., Ltd.'s Lookout Butte Rundle Mississippian discovery 7 miles southeast of Pincher Creek field in the southwestern corner of this Canadian province. An indicated open-flow potential of 31 M.M.c.f.d. is reported at the well after being drilled to 12,648 ft.

During productivity tests the well flowed 22,400 M.c.f.d. from a gross pay of 658 ft. The well also produces 94 bbl. of condensate per million cubic feet of gas.

This well was first rumored a discovery 1 year ago. Last August it took its place as another major gas reserve for western Canada when first flow tests were made. Now the field should take its place among the gas giants north of the border, fields like Pincher Creek, Waterton Park, Jumping Pound and Berland River.

Location of Lookout Butte is just a few miles south of Pincher Creek in the Canadian Rockies. It lies 19 miles southeast of Waterton Park, one of the continent's big gas fields. The 11-31 Lookout Butte discovery is on LSD 11, 31-1-28w4, 5½ miles north of the Montana border on a line with Northern Natural Gas Co.'s Blackleaf Mississippian gas discovery 70 miles farther south in Teton County.

That field was opened in May 1958. It still remains the only producing area on the U. S. side of the Disturbed Belt of the Rockies (known as the Foothills belt in Alberta). Time and time again wildcats have probed the depths on the U. S. side, but with no success, while some of the continent's biggest reserves lie just across the border in Alberta.

Australian well being abandoned

WORD from Australia states that Exoil Pty., Ltd., exploration subsidiary of Oil Drilling & Exploration, Ltd., of Sydney, took the 1 Eyre wildcat to 1,719 ft. A core was taken from 1,714-19 ft., revealing granite basement. An electric log was run to this depth and preparations are being made to abandon the wildcat. Rig will be moved to second location, 1 Gambanga. Spudding should be in about 2 weeks.

Big gas find for eastern B.C.

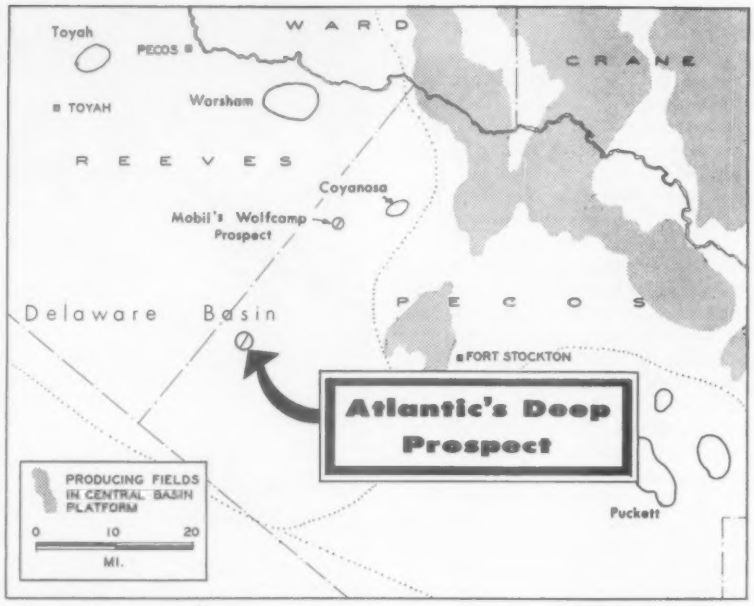
THE TEAM of Pacific Petroleums, Ltd., and Hudson's Bay Oil & Gas Co., Ltd., has indicated a major natural-gas discovery in the general Pocketknife Creek region of northeastern British Columbia, 115 miles northwest of Fort St. John. This new strike found its production in the Mississippian horizon. During drill-stem test over a 194-ft. interval it flowed at the rate of 7,448 M.c.f.d. Coring operations are now proceeding on the venture in an effort to fully evaluate the structure. However, that may take some time as many people feel that the closure on the horizon could be as much as 2,000 ft.

This well, Pacific-H.B. c-37-I Pocketknife, is being drilled on Quarter Unit C, Unit 37, Block L, National Topographic Series Index Map 94-G-7. That places it 20 miles north-northwest of the Sinclair et al. d-12-K Lily Mississippian gas discovery that found its production some 2,900 ft. lower than the depth at which the new discovery was found, 10 miles south of the Sinclair B-3-1 Atlantic exploratory dry hole and almost 30 miles west-northwest of natural-gas production in Jedney field.

Location . . . The venture is situated on what is commonly referred to as the "Pocketknife anticline." That anticline was explained in the Geological Survey of Canada (C. O. Hage, Ottawa, 1944) as being quite evident on the surface and was considered to be a major structure paralleling Klingzut Mountain. It lies west of Minnaker River and crosses the Pocketknife Creek about 2 miles above its junction with the Minnaker. South closure of the anticline is shown by the plunging of Bullhead and Triassic strata immediately north of Pocketknife Creek. Both the new discovery well and the d-12-K Lily wells are drilled along the trend of the anticline.

Tests . . . The new strike found its production during a drill-stem test conducted below the 5,025-ft. level. The flow rate of 7,448 M.c.f.d. was constant during the later part of the 6-hour evaluation. On the other hand, the Lily well uncovered its production in two separate sections of the Debold (Mississippian) horizon, one of which was found at 7,910 ft., the other at 8,205 ft. It was eventually completed with an initial potential of 24 M.M.c.f.d. and proved reserves of some 58 billion cubic feet.

B. C. busy . . . A great deal of exploration news is coming out of northeastern British Columbia now that winter programs are in full swing. Recently it was announced that Gulf States Oil Co. of Canada had completed one field-extension well with a very high potential and had discovered gas at another in the same general area—near Fort Nelson. Further testing on the completion proved the initial open flow of 70 M.M.c.f.d. to be rather conservative as it was later calculated at between 200 and 500 million cubic feet per day. The discovery well, 3 Fort Nelson, meanwhile, has further penetrated the Middle Devonian porosity and has indicated about 350 ft. of continuous dolomite which makes it the thickest yet found. However, it is understood that control problems on the well at present have made it



A DEVONIAN gas discovery in the Delaware basin has added fire to an area already hot. Atlantic 1 Kelly flowed an estimated 15 M.M.c.f. of gas on drill-stem test. Mobil 1 Moore, Wolfcamp oil discovery to the northeast, is coring below 15,109 ft.

Delaware basin probed again by . . .

Atlantic . . .

West Texas' Delaware basin is back in the news again, with prospects of another pre-Permian discovery in the basin's southeastern lobe.

Atlantic Refining Co. 1 J. C. Kelly is 31 miles almost due west of Fort Stockton, in SW SE Section 8, Block 51, Township 10, T&P Survey. First hint of gas production came when operators tested the Devonian at 15,798-15,873 ft. Gas surfaced in 16 minutes at the rate of 1,750 M.c.f.d., under flowing pressure that ranged from 3,210-3,100 psi. Thirty-minute shut-in pressure was 7,310 psi.

Second Devonian test was open 35 minutes on the interval 15,873-15,923 ft. Gas flowed in 20 minutes at the estimated rate of 15 M.M.c.f.d. Another test at 16,211-94 ft. failed due to mechanical trouble and operators continued drilling below 17,091 ft. in lime and shale.

and Mobil

Mobil Oil Co. 1 Kathleen J. Moore, Wolfcamp oil discovery 15 miles northwest of Fort Stockton, cored lime and shale with no shows at 15,085-15,109 ft., and prepared to core ahead.

No. 1 Moore has flowed oil from several intervals in the Wolfcamp, starting at 10,890 ft. Mechanical trouble over the past few weeks have delayed progress.

No. 1 Kelly was originally scheduled to 15,200 ft. It is located on a 161-acre lease in an area that has no nearby production, and only a scattering of Permian tests. Nearest pre-Permian basin production is at Toyah gas field (Devonian), 30 miles to the northwest, and at Puckett multipay field, 50 miles to the southeast, where a large central portion of the field has Devonian gas.

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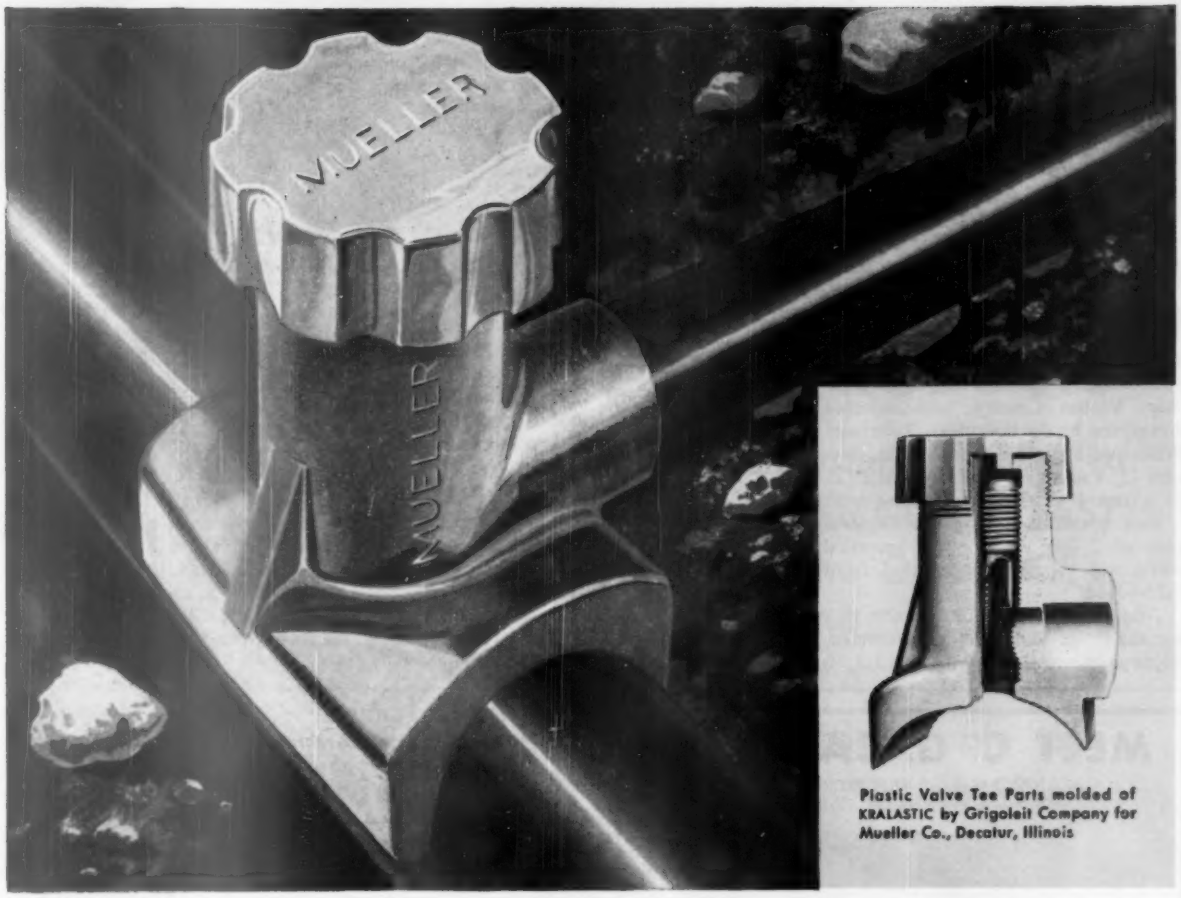

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very hazardous and rumors have it that drill pipe will be used to case the well—a very unusual occurrence.

All in all, it appea that much more exploration news is in the making in this part of Canada. Recently, Westcoast Transmission Co. officials, appearing before the National Energy Board in Ottawa, stated that to date gas reserves per wildcat well in British Columbia are double that of Alberta. Therefore, with nearly 35 rigs working on exploration holes at present in the northeastern sector of that province, more than half are expected to be discoveries.

Ohio well taps Clinton sand

THE BEST WELL in the gas play east of Richland field in Swan Township, Vinton County, was reported completed by the operators, Roberson-Williams. Their 1 M. B. Shurtz, Section 15, had a flow of 23,500 M.c.f.d. in a test 5 days after fracture with a rock pressure of 855 psi. Natural gage of 2,480 M.c.f.d. was recorded while still in the Clinton sand from 2,730-38 ft.

Additional completions in the area include J. A. Dubach 1 Cost Conley, Section 15, with 12,230 M.c.f.d. 6 days after fracture. It had 1,090 M.c.f.d. natural with rock pressure of 850 psi. from the sand at 2,711-18 ft. Darrell Blanton 2 Roscoe Campbell, Section 15, gaged 5,550 M.c.f.d. after fracture from the pay at 2,931-39 ft. Natural gage was 1,500 M.c.f.d. with rock pressure of 755 psi. And his 2 Pearl L. Bray, Section 22, gaged 6,800 M.c.f.d. after fracture with a rock pressure of 680 psi. The Clinton sand was reported at 2,734-54 ft. and gaged 200 M.c.f.d. natural.

Deep tests . . . Roy Stewart is continuing drilling 1 Kenneth Mosher, Section 2, Lake Township, Ashland County, after fishing for tools at 4,924 ft. Clinton depth in the area is about 3,100 ft.

Continental Oil Co. has moved to a third location in southwest Ohio. This test is in Clear Creek Township, Warren County on 1 Helen Sellars, Section 4. A gas pocket was encountered here in the Ordovician shale at about 450 ft., which became ignited, causing extensive fire damage to the rig.

Second try under way at Kentucky oil site

In Bell County, southeastern Kentucky and east of Pineville, the county seat, United Fuel Gas Co. is drilling at 3,060 ft. at its wildcat 1 A Knuckles. This test, the second in the area, is some 1,500 ft. from the first hole 1 Knuckles, which had to be abandoned due to straight-hole difficulties at 3,425 ft. Both wells are located a short distance from the Pine Mountain fault.

Kentucky production

November 1959

County—	Wells producing	Barrels produced
Green and Taylor	2,227	607,720
Metcalfe	38	27,382
Cumberland	4	1,235
Hardin	17	1,559
Hart	3	119
TOTALS	**2,289**	**638,015**

December 1959

County—	Wells producing	Barrels produced
Green and Taylor	2,193	559,970
Metcalfe	41	20,294
Cumberland	5	2,398
Hardin	19	1,424
Hart	4	342
Clinton	3	169
TOTALS	**2,265**	**584,597**

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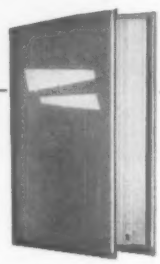

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Here's drilling action in California . . .

Gas discovery seen for California test

Early indications point to a possible new gas-field discovery for a wildcat being drilled by McCulloch Oil Exploration Co. of California about 15 miles northwest of the Corning gas field in Tehama. If the well develops into a commercial find, it will rank as Central California's most northerly oil or gas development. The drill site is about 9 miles southwest of the town of Red Bluff. The discovery possibilities developed when reports had the wildcat coming up with oil and gas shows someplace above 4,994 ft. The operator was preparing to drill ahead after setting 5½-in. casing to 3,742 ft. The well is 1 McCulloch-Sunray-Stevenson located in SW NE 24-26n-5w.

Other companies have been actively leasing in the same general area including Texaco Inc., Humble Oil & Refining Co., Standard Oil Co. of California and Pat Doheny, operator.

Development pace stepped up on Summerland lease

Development drilling on the 5,500-acre Summerland offshore lease in California was slated to be stepped up with the announcement that a contract has been awarded for onsite erection of a second platform. Standard Oil Co. of California, as operator for itself and Humble Oil & Refining Co., said drilling on the second platform would probably start late this summer. Meanwhile, wells 9 and 10 were being completed simultaneously from the existing platform on the lease.

North-coastal test slated in California

A well was slated to be spudded in the last week in northern California's Humboldt County which will just about complete the cycle for oil drilling in the state.

The well, 1 Mathews, is located in the Mattole River Valley, about 40 miles south of Eureka on the remote coast of the county.

It was just 99 years ago that early California newspapers mention a well being drilled for oil on the nearby Davis Ranch in Humboldt County which appears to be the first such well drilled in the state. In 1865, the state's first full-fledged oil boom developed and the first well in the play drilled about 4 miles northeast of the location for the 1 Mathews well.

The Humboldt Times, June 10, 1865, noted that six packages of from 15 to 20 gal. each of coal oil taken from the well was being shipped to San Francisco by steamer for refining.

Humboldt County never did develop a commercial oil field, although a small gas field was opened at Tompkins Hills field near Eureka many years later.

Otto W. Clark, operator on 1 Mathew, announced it would be drilled with cable tools, lending an additional nostalgic note to his wildcat. Cable tools have been something of a rarity in California in recent years.

Rio Vista deep test sets field depth mark

A programed 15,000-ft. deep test of the Rio Vista gas field in Solano County, California, recently passed the field depth record when it went below 11,051 ft. Standard Oil Co. of California was drilling the deeper zone search on a location on the north edge of the field about 2 miles north of the town of Rio Vista. The former field depth record holder was Amerada Petroleum Corp.'s 4 McCormick 1 mile south of town. Standard's extension test, 11 Peter Cook, was drilling ahead below 12,248 ft.

Moorpark test slated in California

Terry Drilling Co. and the Petan Co., Santa Barbara, were moving in a rig to drill a 5,000-ft. Sespe test in the Moorpark region of Ventura County about 6 miles west of the old Simi field. The drill site is on a 600-acre lease in an area where a number of major operators have substantial holdings.

. . . and Wyoming

AN IMPORTANT extension to Patrick Draw Unit field in the Green River basin of Wyoming is reported complete. It is Union Pacific Railroad Co. 13-31 UP in NW SW 31-19n-98w, Sweetwater County, southwestern Wyoming.

The well flowed 202 bbl. of oil and 142 M.c.f.d. through 19/64-in. choke from Almond Mesaverde Upper Cretaceous perforations at 5,218-42 ft. Location of this new producer is 1½ miles northeast of the field discovery well. This is the first success northeast of the field.

Gulf Oil Corp. has a well drilling southwest of this strike in SE 36-19n-99w. Continental Oil Co. is coring

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below 4,858 ft. southwest of Patrick Draw at 5-2 Sand Butte Unit in C NW NE 5-17n-99w. A drill-stem test in the Almond at 4,762-4,814 ft. flowed gas at the rate of 750 M.c.f.d.

In West Desert Springs field to the north, Union Pacific completed Almond oiler at 12-33 UP in SW NW 33-20n-99w for 180 bbl. per day, and at 34-29 UP in SW SE 29-20n-99w for 200 bbl. per day.

Drilling spreads out in Illinois basin

ILLINOIS BASIN developments included strikes in Spencer County, Indiana, Sangamon, Wayne, and Christian counties, Illinois, and McLean County, western Kentucky.

In Indiana's Spencer County, 2 miles northwest of Grandview, Art Althaus 1 Allen Freschley, NW SW NE 36-6s-6w, flowed 7 bbl. of oil on tests of the Benoist at 1,198-1,205 ft. Pump will be installed.

In Sangamon County, 4 miles southeast of the city of Springfield and 1 mile southwest of Rochester, Ill., Aladdin Oil Development Co. 1 T. E. Scott, SE NW SW 21-15n-4w, was completed flowing 600 bbl. per day from Silurian reef at 1,590-1,605 ft.

In Wayne County, 7 miles southwest of Fairfield, Texaco Inc. added another deep well at 3 H. Silverman in W½ NW NW 16-3s-7e. The new well flowed 340 bbl. per day from Dutch Creek at 5,320-31 ft. This well and field are the deepest producing areas in the basin. The 3 Silverman holds the current title of deepest producer in Illinois and the basin.

In Christian County, Reeter & Hirstein 1 Maude Burchell, SE SW NE 22-15n-1w, 3 miles southeast of Mount Auburn, was finaled for 280 bbl. per day on pump from Silurian at 1,921-30 ft. This is a new producing area being developed quite successfully.

In Kentucky's McLean County, Chester Humphrey is coring at 1,152 ft. in Stray sand at 1 Estil Howard Estate, 2 miles west of Nuckols in 17-M-29. The well is an indicated discovery after filling up 900 ft. of oil in 48 hours at 1,147-50 ft.

Dual-completion Texas wildcat opens new field

A wildcat drilled by Atlantic Refining Co. on a prospect 2½ miles southwest of Village Mills, in northern Hardin County, Texas Gulf Coast, is assured of good gas-condensate production in at least one of two potential pay zones.

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duction, in East Village Mills field northeast of it. Hickory Creek field is 3¼ miles southwest of Hickor Creek field, next nearest production.

Two pays were logged. Present completion is in the deeper, perforated at 10,045-50 ft. During a 12-hour test through 10/64-in. choke, the well (1-E Kirby) flowed at the rate of 1,650 M.c.f.d. with 112 bbl. of condensate. Flow pressure was 3,840 psi.

The upper pay yet to be tested is at a depth of 9,500 ft.

Louisiana field extended northwest

TRAVIS PEAK production in the sprawling Bear Creek field in northeastern Bienville Parish, North Louisiana, is jumping 1½ miles northwest in an extension well drilled by Milton Crow, Inc., and Robert P. Evans & Associates.

Their No. 1 Whitley, in 26-17n-6w, came in with a calculated open-flow potential of 3,200 M.c.f.d. from pay at 7,602-10 ft. It had been drilled to 8,218 ft. Shut-in tubing pressure is 3,085 psi.

Tested through 16/64-in. choke, the well flowed 1,996 M.c.f.d., recovering 4 bbl. of condensate.

Texas wildcat hits gas

Dry gas production has been opened in the latest wildcatting venture in the lower Laguna Madre, in sparsely explored Cameron County, at the south tip of Texas.

Discovery well, drilled by Texaco Inc., is 7 miles down the coast from gas production found in Laguna Madre by Humble Oil & Refining Co. last year. Humble's discovery is East Three Islands field. Texaco's new find may be called Holly Beach field. It is 7 miles northwest of Port Isabel in State Tract 713.

Calculated open-flow potential is 3,800 M.c.f.d. Shutin pressure is 3,073 psi. Flowing pressure through ¼-in. choke with daily flow rate of 2,767 was 1,725 psi. Production is from lower Miocene, perforated at 7,556-62 ft. and 7,568-76 ft. Total depth is 8,924 ft.

Michigan wildcat is good prospect

MICHIGAN'S hottest wildcat test drilled more gas in Trenton dolomite and will be deepened another 500 ft. or to oil pay, the prime objective.

Bell and Gault Drilling Co. 1 Pritchard, C SW SW 11-1s-3w, Springport township, Jackson County, logged Trenton at 4,563 ft. and had an estimated 100 M.c.f.d. gas at 4,631-40 ft. Gas pay was cemented off to permit deepening. Test picked up estimated 2 M.M.c.f.d. gas at 4,700 ft. and again has been cemented off. Wildcat is located "off trend" 10 miles northeast of Albion.

- Perry Fulk 1 Zaremba, SE SE NE 28-4s-3w, Jackson County, pumped 71 bbl. oil in 18 hours initially from 4,338-56 ft. dolomite-sand pay. Test is midway between Scipio and Pulaski Trenton-Black River zone oil pools. The Zaremba pay is below the base of the Black River and "cautiously" identified as St. Peter sand.

- The fifth commercial oil well within the city of Albion has been completed. Wells are on the west side of the city outside of the residential and business areas. However, efforts to prove up a substantial northwest extension of the Albion field, Calhoun County, have been unsuccessful to date. Four dry holes, from ½ to 1½ miles out, now have been fanned across the northwest end of the pool. This end of the Albion-Pulaski-Scipio play that dominated Michigan development last year, appears headed for a slowdown, if pending extension efforts also fail.

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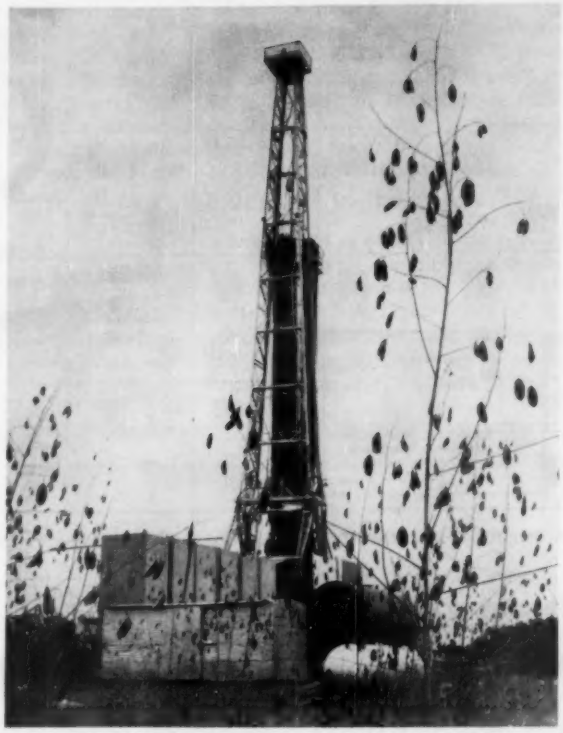
Bit bites deep in South Texas

THE DEEPEST well ever dug in South Texas is Shell Oil Co.'s 1 Carroll in DeWitt County. This new wildcat record-holder for both Districts 1 and 2 went to 19,765 ft. Previous title-holder in South Texas was Magnolia (Mobil) A-417 West Ranch in Jackson County at 19,062 ft. in the Jackson Eocene rocks.

That well was in District 2 as is Shell's new wildcat. The deepest hole in District 1 is Humble 1 The Mills Mineral Trust in Val Verde County at 17,525 ft. in Ellenburger Cambro-Ordovician. Deepest well in District 3 is Humble 1 Robertson-McDonald in Liberty County at 18,074 ft. in Vicksburg Oligocene. District 4's deep hole is Ginther et al. 1-A Killam in Webb County at 19,503 ft.

The deepest hole in Texas is Phillips Petroleum Co. 1-EE University in Pecos County at 25,340 ft.

Drilled by Meadows and Walker Drilling Co. of Houston, the well has been plugged back and preparations are now under way for testing upper zones.



THIS IS THE DEEPEST well in South Texas at 19,765 ft. It is Shell Oil Co.'s 1 Carroll wildcat in DeWitt County.

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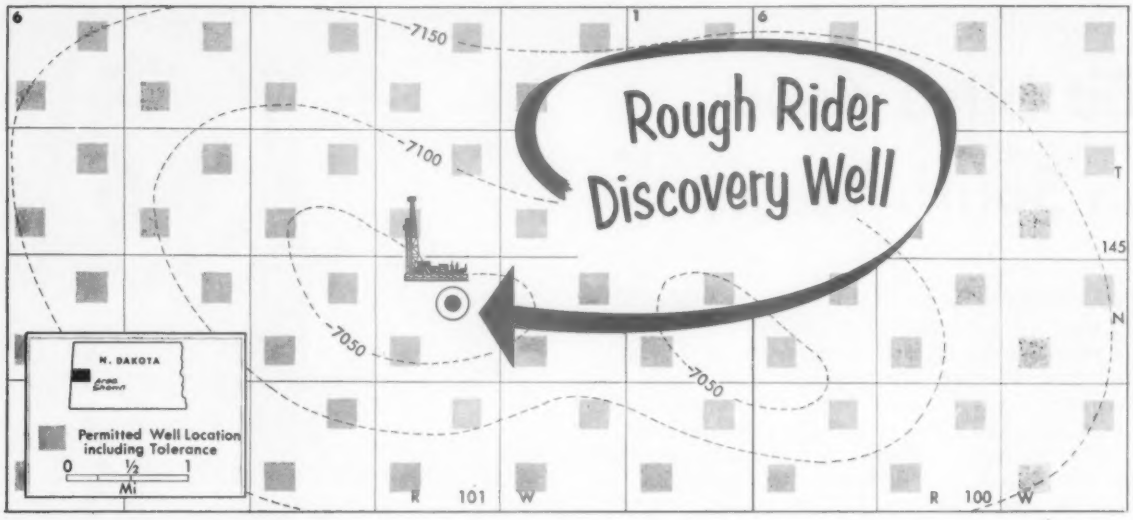

A UNIQUE SPACING PATTERN has been set for Williston basin's promising new Rough Rider field in western North Dakota.

In answer to a Shell request

Wide spacing set for North Dakota field

THE NORTH DAKOTA industrial commission set 320-acre spacing for the new Rough Rider field in McKenzie County.

This 320-acre ruling was in answer to Shell Oil Co.'s plea for such action. The discovery well was Shell-Northern Pacific Railway 32-15 NP in SW NE 15-145n-101w. Completion was 1,526 bbl. of oil per day, flowing through 32/64-in. choke. Perforations were at 9,399 ft. in the Mission Canyon Mississippian. Most of the state's development has been on 80 acres.

The field was also defined by the commission and the group also specified that future drilling will be in the northeast and southwest quarter sections and not less than 660 ft. from a boundary. Rough Rider, according to the state order, includes all sections from 4 through 21-145n-100w and all sections from 1 through 24-145n-101w.

First big Wyoming find in '60 is gasser

WYOMING'S first big gas discovery of the year apparently has commercial flows in the Frontier Cretaceous as well as in Mancos, Mesaverde, and Nugget, with oil possibilities in the Shinarump.

Sohio Petroleum Co. 1 Cow Creek Unit in NW SE 12-16n-92w, Carbon County, flowed for 11 hours through 1-in. choke making 2,880 M.c.f.d. After 2½ hours on ½-in. choke it made 2,760 M.c.f.d. Flow was stabilized at 2,355 M.c.f.d. on ¼-in. choke. Perforations are at 8,520-65 ft. in the Frontier sand. Casing scraper is being run.

Previously, the well showed production in the Mancos, Mesaverde, and Nugget. A recovery of 500 ft. of oil was reported on drill-stem test in Shinarump.

Other news . . . Other Wyoming events included Sinclair Oil & Gas Co.'s completion of a Sundance gas discovery at Bell Springs in Carbon County. That well flowed 8,150 M.c.f.d. from 2,700 ft.

Continental Oil Co. tested 750 M.c.f.d. at Sand Butte in Sweetwater County, Green River basin. Flow was in the Almond Mesaverde Cretaceous.

In the Powder River basin, True Oil Co. et al. swabbed 35 bbl. of oil in 8 hours from Minnelusa Pennsylvanian southwest of Timber Creek field in Campbell County.

Travis Peak zone flows oil in East Texas wildcat

Completion potential has been made at a Travis Peak oil discovery in central Rusk County, East Texas. The new discovery is Raymond H. Hedge, of Tyler, 1 J. Al Morris, 6½ miles south of Henderson.

The well flowed 226 bbl. of oil in 22 hours through 3/16-in. choke, for a daily rate of 247 bbl. of oil. Production is from perforations at 7,541½-45½ ft., following acid and fracture treatment. Flowing tubing pressure was 300 psi., gas-oil ratio was 624:1 and gravity of crude was 41°. No. 1 Morris also had oil and gas shows in the Pettet at 7,218-68 ft.

No. 1 Morris is on a 150-acre tract in the Daniel Reed Survey, A-31. It is 2 miles southeast of the discovery of Pone field, which is a gas-condensate producer from the Rodessa.

Operators have asked the Texas Railroad Commission to designate the new field as North Laneville.

Deep exploration planned for East Texas Salt Dome

Location has been made for a 10,000-ft. wildcat on the western flank of Boggy Creek Salt dome in eastern Anderson County, East Texas.

The well will be Texaco Inc. 1 Elvira Jones. Location is on a 313-acre lease in Mark Roberts Survey, A-669. Projected depth is expected to penetrate the Rodessa.

Nearest deep test in the area to furnish subsurface information lies about 2 miles to the southeast, on the east side of the salt dome. This was Humble Oil & Refining Co. 1 W. T. Todd, in the David Roberts Survey, which was drilled dry to 12,251 ft. in 1956.

Cleveland sand oil discovery finaled in Texas

The Texas Panhandle gained another Cleveland sand Pennsylvanian oil area with completion of Shamrock Oil & Gas Corp. 2 James Elrich Wilson in south-central Ochiltree County.

The well flowed 127 bbl. of oil per day on 1-in. choke from perforations at 7,480-7,502 ft. Location is in Section 145, Block 1-B, T&NO Survey, 1¼ miles southeast of Buler field.

New pay found in Arkoma gas field

The Hartshorne sand is a new pay for a newly opened field in southeastern Oklahoma's Coal County. International Oil Co. found gas in the Pennsylvanian pay at 2 Crane in C NW SE 19-2n-9e.

The well flowed 1,320 M.c.f.d. from perforations at 1,816-26 ft. The discovery well of the field in SE SW NE 19, the 1 Crane, flowed 4,160 M.c.f.d. from Booch sand perforations at 1,610-20 ft. Location of this area is northwest of Northwest Centrahoma field, a one-well Hunton Siluro-Devonian producer at 5,800 ft.

In Centrahoma pool, Drilling and Exploration 2 Cody, NE SW SW 27-2n-9e, flowed 15 bbl. of oil daily on 7/32-in. choke from perforations in basal McLish Ordovician sand at 6,578-79 ft.

Texas County multipay field shaping up

A fast-growing multipay producing area in the Oklahoma Panhandle gained an important link well last week at Republic Natural Gas Co. 1-M Jacobs in SE NW 26-5n-13eCM.

Potential is awaited at the Morrow Pennsylvanian "A" sand oil discovery from perforations at 6,166-70 ft. Latest swab was 25 bbl. load oil and 64 bbl. new oil in 22 hours.

Location is in the Southwest Hough, Northeast Postle area, both multipay fields. South Hovey field has Cherokee oil and Morrow gas. Northwest Hough has Morrow "G" sand oil, A and A-1 oil. Keyes gas production is assured here, also. East Postle field has Cherokee, Morrow, and Morrow "G" sand production.

Morrow pool seen for Panhandle area

In the Oklahoma Panhandle, Kerr-McGee Oil Industries, Inc., 1 Martin-Dixon Unit is an apparent Morrow Pennsylvanian gas discovery.

The well flowed 3,780 M.c.f.d. during tests at 6,695-6,739 ft. Location is in C SE NW 28-5n-27eCM, 3 miles east of Knowles and 2 miles south of South Glenwood Morrow gas field.

Southwest Kansas field extended to the south

Leslie pool in Meade County, Kansas, was moved ½ mile south by Petroleum Exploration Inc.'s 1-13 Leslie in C NW NW 11-33s-30w.

The well flowed 99 bbl. of oil per day on ½-in. choke from Morrow Pennsylvanian at 5,756-74 ft.

This announcement is neither an offer to sell nor a solicitation of an offer to buy these securities. The offer is made only by the Prospectus.

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(Canadian)

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Commencing August 1, 1960

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The Debentures are being offered to the public in each of said countries only by dealers authorized so to do by the laws of the respective countries.

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January 26, 1960.

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VALVES

Chester discovery flows in Oklahoma's Woodward

In Woodward County, northwestern Oklahoma, Ashland Oil & Refining Co. 1 Fox Unit in SE NE 4-20n-17w gaged 5 M.M.c.f.d. on a 1-hour drill-stem test of Chester Mississippian at 7,978-93 ft. This is a confirmation well to 1 Shoreline in C NE SW 34-21n-17w. That November discovery flowed 3,500 M.c.f.d.

New pool opens in Oklahoma's Kingfisher

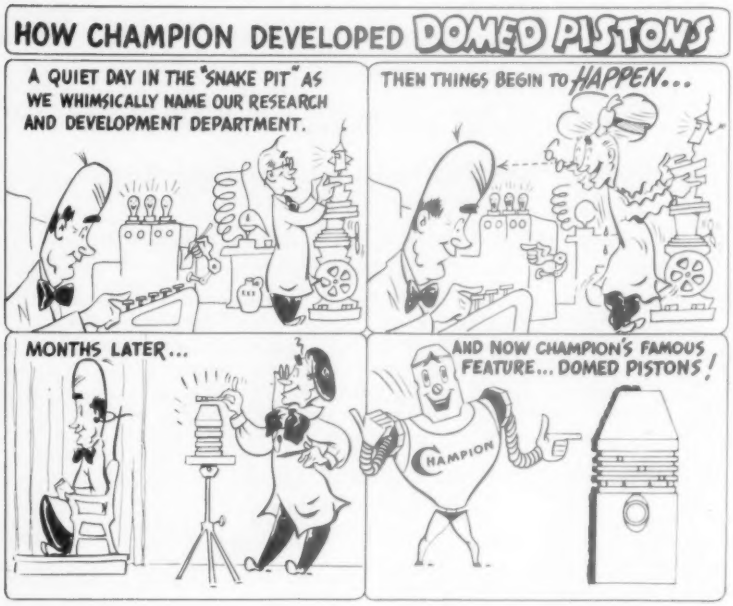
A new gas pool opened in the Manning trend of Kingfisher County in Oklahoma. The discovery well is Apache Oil Corp. 1 Show Unit in C SE NW 5-15n-7w, 3 miles northeast of North Okarche field.

The well flowed natural at the rate of 5,200 M.c.f.d. on ½-in. choke from series of perforations at 7,814-57 ft. in Manning-Upper Mississippian.

Springer pay opened in Comanche County

A Comanche County wildcat in southwestern Oklahoma is a Springer discovery. The strike is Continental Oil Co. 2 Mansel in NW SW 14-30n-10w. It flowed at the rate of 1,738 M.c.f.d. and 60 bbl. condensate per day on 28/64-in. choke from deep Pennsylvanian perforations at 10,038-70 ft.

The discovery well, 1 Mansel, flowed 203 bbl. of oil and 1,190 M.c.f.d. from Arbuckle Cambro-Ordovician. The well was completed last year and then reworked. Tests of the Bromide proved futile and the well was abandoned.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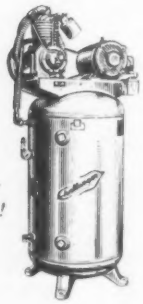

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Discovery wells

CANADA

Alberta: Texaco Inc. 1-22-49-27 Buford, LSD 1, 22-49-27w4. D2 oil discovery. TD 6,310 ft.

Cabeen 4-35-39-5 Leslieville, LSD 4, 35-39-5w5. Indicated Cardium oil discovery. TD 6,041 ft.

British-American 11-31 Bookout Butte, LSD 11, 31-1-28w4. Mississippian gas discovery. TD 12,648 ft.

Mobil-Pan American 6-15 Wakahigan, LSD 6, 15-64-23w5. Gas discovery. TD 4,969 ft.

Pan American J-1 6-14 Birch Lake, LSD 6, 14-49-11w4. Ireton gas discovery. TD 2,600 ft.

British Columbia: Union-Hudson's Bay D-46-A Milligan Creek, D-46-A-94-H-2. Triassic oil discovery. TD 3,780 ft.

COLORADO

Adams County:

Dawson Oil Co. 2,734-1 Morris, NE SE 34-2s-57w. IPP 160 BOPD, "J" sand discovery, new field. TD 5,550 ft.

B. F. Allison 1 Rosener, C NE SE 18-1s-59w. IPP 50 BOPD, "J" Sand discovery, new field. TD 6,237 ft.

Morgan County:

J. T. Paddleford 1 Poe, OWWO, OTD 6,139 ft. IPP 30 BOPD, "D" sand discovery, new field.

NORTH LOUISIANA

Lincoln Parish:

The California Co. 2 Jessie Mae Norris et al., C SE NW 15-18n-1w. IP 1,180 M.c.f.d., 24 BCPD, 20/64-in., 55.1°, TP 425 psi., perf. 9,298-9,337 ft., Cotton Valley-Vaughn sand. TD 10,615 ft. New pay in Tremont field.

SOUTH LOUISIANA

Beauregard Parish:

Highland Oil Co. 1 Heyden Newport Chemical Co., 29-5s-11w, 3 miles southwest of Singer field. IP 70 BOPD (net), 20% b.s. and w., 12/64-in., 29.5°, GOR 1,503 cu. ft. per bbl., TP 300 psi., perf. 7,587-90 ft. TD 8,508 ft. New-field discovery.

Iberia Parish:

Richardson & Bass 1 Henry Breaux-J. R. McDonald Unit, 41-12s-5e. IP 42 BOPD, 3,900 M.c.f.d., 14/64-in., 46°, TP 3,500 psi., perf. 11,461-80 ft. TD 13,121 ft. New pay in Jefferson Island field.

Lafayette Parish:

Arkansas Fuel Oil Corp. 1 James E. Hernandez, 31-8s-4e, 2½ miles northeast of Ossun field. IP 145 BOPD (net), 17% b.s. and w., 5 M.M.c.f.d., adjustable choke, 49°, TP 4,117 psi., perf. 10,951-66 ft. TD 11,647 ft. New-field discovery.

St. John the Baptist:

F. A. Callery-Pioneer Oil Co. 2 Lutcher-Moore, 1-11s-7e, 1 mile north LaPlace field. IP 144 BOPD, 6/64-in., 48°, GOR 882 cu. ft. per bbl., TP 1,535 psi., perf. 9,037-41 ft. TD 10,460 ft. New field.

St. Landry Parish:

W. T. Burton 1 Nathalie Haas Hirsch, 139-5s-3e, 5 miles southeast of Ville Platte, IP 61 BOPD, 900 M.c.f.d., 10/64-in., 47°, TP 2,300 psi., perf. 10,-748-64 ft. TD 10,790 ft. New-field discovery.

Terrebonne Parish:

The California Co.-Southern Natural Gas Co. 1 Nelson, 2-21s-12e, 1¼ miles southwest of Mosquito Bay discovery well. IP 3,900 M.c.f.d., dry gas, 32/64-in., TP 2,100 psi., perf. 13,226-38 ft. and 13,251-60 ft. TD 16,018 ft. New pay and extension Mosquito Bay field.

Vermilion Parish:

Texaco Inc. 1 Edier Bares, 34-11s-4e. IP 2,679 M.c.f.d., 34 BCPD, 7/64-in., 46.4°, TP 10,250 psi., perf. 14,810-18 ft. TD 15,368 ft. New pay in Parcperdue field.

Richardson & Bass 1 Acme et al. Unit, 22-11s-2w. IP 4,700 M.c.f.d., 30 BOPD, 13/64-in., 37.4°, TP 6,160 psi., perf. 11,769-11,800 ft. TD 11,830 ft. New pay in Riceville field.

LOUISIANA OFFSHORE

Eugene Island Area:

Pan American Petroleum Corp. 1 OCS-0572, Block 193. IP 2,800 M.c.f.d., 24 BOPD, 12/64-in., 59.6°, TP 4,100 psi., perf. 12,168-80 ft. TD 15,837 ft. Extension and new pay in Eugene Island Block 208 field.

Ship Shoal Area:

Shell Oil Co. 1 OCS-0588, Block 139. IP 432 BOPD, 10/64-in., 37.6°, GOR 1,476 cu. ft. per bbl., TP 3,000 psi., perf. 15,016-32 ft. TD 15,470 ft. New pay in Ship Shoal Block 139 field.

NEBRASKA

Banner County, Panam Area:

Chandler & Simpson 1 Mossburg, C NE NW 20-17n-55w. IPP 476 BOPD, "D" sand 6,262-68, 6,276-80 ft. TD 6,477 ft. "D" sand discovery, new pay.

Pure Oil Co. 1 Brauer-A, C NE NW 34-18n-57w. IPP 180 BOPD, "J" sand discovery, new field. TD 6,960 ft.

D. J. Pickrell 1-24 Olsen, C SW SE 24-19n-57w. IPP 165 BOPD, "D" sand discovery, new field. TD 6,340 ft.

Edward Mike Davis 1 Vogt, C NW SW 21-18n-57w. IPP 85 BOPD, "J" sand discovery, new field. TD 6,905 ft. Opens Vogt field.

Kimball County:

Nebraska Drillers 1 Cornils, C SW SE 33-14n-57w. IPP 161 BOPD, "J" sand discovery, new field. TD 7,044 ft.

NORTHWEST NEW MEXICO

Rio Arriba County:

El Paso Natural Gas Co. 94 San Juan Unit, 28-6, SE NW NE 36-28n-6w. IPF Mesaverde 2,300 M.c.f.d., ¾-in. choke; IPF Dakota 2,564 M.c.f.d., ¾-in. choke. Dakota discovery, new pool. Mesaverde 5,097-5,624 ft.; Dakota 7,552-7,770 ft. TD 7,920 ft.

OHIO

Morrow County:

Monk Oil & Gas Co. 2 J. N. Monk, Bennington Township, Sec. 22. Glenwood 3,589-91 ft. Cambro-Ordovician 3,606-17 ft., 100 BOPD, 265 M.c.f.d. TD 3,731 ft.

TEXAS GULF COAST

Calhoun County:

Brazos Oil & Gas Division of Dow Chemical Co. 10 Powderhorn, Sec. 5, Blk. J, Calhoun County Cattle Co., Juan Cano Sur., 7 miles northwest of Port O'Connor. IP 13 BOPD (net), 39% water, 6/64-in., 30.2°, GOR 23,486 cu. ft. per barrel, TP 1,625 psi., perf. 5,207-10 ft., Miocene, and AOF 16,700 M.c.f.d., dry gas, shut-in TP 2,077 psi., perf. 5,070-80 ft., Miocene. TD 5,412 ft. New pays in Powderhorn field.

Superior Oil Co. 4 Maude B. Traylor, Phillip Dimmit Sur., 6 miles northwest of Olivia. AOF 51 M.M.c.f.d., GLR 17,472 cu. ft. per barrel, 52.2°, shut-in TP 5,691 psi., perf. 10,470-82 ft., Frio. TD 11,425 ft. New pay in North Maude B. Traylor field.

SOUTHWEST TEXAS

Atascosa County:

Thomas Drilling Corp. et al. 1-B A. H. Peeler, Section 11, J. Poitevent Sur., A-955, 5 miles southeast of Peeler field. IP 43 BOPD, 12/64-in., 21.5°, GOR 1,799 cu. ft. per bbl., TP 290 psi., perf. 3,225-28 ft., Carrizo. TD 6,186 ft. New-field discovery.

Brooks County:

Texaco Inc. 28 McGill Brothers NCT-1, San Antonio Grant, A-214, 16 miles southwest of Encino. AOF 2,510 M.c.f.d., GLR 125 M.c.f. per bbl., 56°, shut-in TP 3,015 psi., perf. 7,707-22 ft., Vicksburg. TD 8,227 ft. New pay in Encinitas field.

Humble Oil & Refining Co. 11 Santa Fe Ranch, San Salvador Del Tule Grant, A-45, 8 miles southeast of Encino. Potential gas well standing, casing not perforated. TD 9,500 ft. New-field discovery.

Dimmitt County:

Shamrock Oil & Gas Corp. 3-D Blanch Eubank, Section 19, Block 10, I&GN Sur., A-405, 8 miles northwest of Carrizo Springs. AOF 5,010 M.c.f.d., dry gas, shut-in TP 917 psi., perf. 2,308-10 ft., Navarro-Olmos sand. TD 2,650 ft. New pay in Blanch field.

Shamrock Oil & Gas Corp. 22 Fitzsim-

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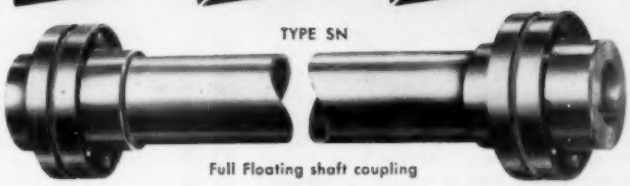

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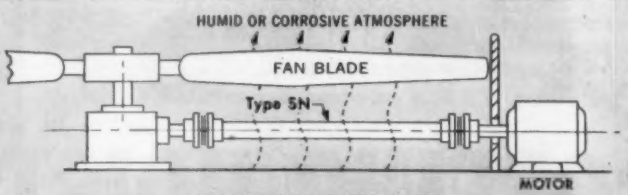

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In the typical cooling tower installation shown above, the motor — outside the humid or corrosive atmosphere — is connected by a floating-shaft coupling to the gear box under the large slow-speed, horizontal-blade fan.

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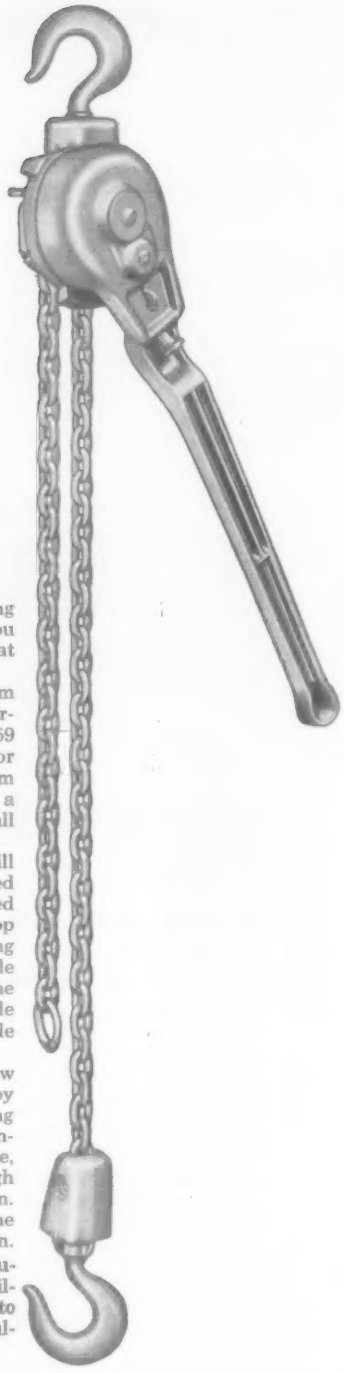
Again Coffing Brings You a New Line of Hoists



For the second time in less than a year Coffing has introduced a new hoist line to give you easy, safe, positive efficient lifting power at moderate cost.

The new RA Series Safety Pull Aluminum Ratchet and Pawl Lever Hoist is easy to operate—requires minimum handle pull—only 59 pounds for the ¾-ton model to 97 pounds for the 6-ton model. It may be operated from either side and the design prevents freezing a load. Load rotation is easy because of ball thrust bearings in the load hook assembly.

Safety has been built into the hoist. It will not ratchet under load if handle is released nor will it free chain. Controls are protected from inadvertant shifting. The bottom stop eliminates any hazard from the handle being released unintentionally and prevents handle from being moved to a position parallel to the load chain which would develop undesirable twisting action. The exclusive safety handle bends to indicated overload.

Strength without excess weight in the new hoist is achieved by a special aluminum alloy which is used in the body and handle. Long service life has been provided by the high tensile material in the chain retaining guide, heat treated load sheave and the plated, high tensile, heat treated alloy steel link chain. Maintenance is held to a minimum by the rugged construction and simplicity of design.

The new Coffing RA Series Safety Pull Aluminum Ratchet and Pawl Lever Hoist is available in six models with capacities from ¾ to 6 tons. Ask your supply store or write for Bulletin ADH-86.

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COFFING HOISTS
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mons et al., Francisco Lombrano Grant, A-1360, 20 miles southwest of Carrizo Springs. AOF 222 M.c.f.d., shut-in TP 1,148 psi., perf. 2,862-71 ft., Navarro-Olmos sand. TD 3,150 ft. New pay in Hugh Fitzsimmons field.

Sun Oil Co. 3 Straus, Section 31, T&NO Sur., A-784, 6 miles south of Carrizo Springs. IP 26 BOPD (net), 67.50% water, 9/64-in., 39.9°, GOR 650 cu. ft. per bbl., TP 480 psi., perf. 3,322-24 ft. and 3,226-30 ft., Navarro-Olmos sand. TD 3,652 ft. Extension and new pay in Straus area.

Duval County:

Gulf Coast Minerals Management Corp., John Burkhart et al. 1 Lennie Ray, Section 19, Spring Creek Irrigation Co. Sur., A-750, 10 miles north of San Diego. AOF 4 M.M.c.f.d., GLR 300 M.c.f. per bbl., 64°, shut-in TP 775 psi., perf. 1,899½-1,902½ ft. TD. New-field discovery.

Haas Brothers et al. 1 Sutherland, Section 120, M. Saenz-I. G. Sutherland Sur., A-2044, 7 miles south of Freer. Shut-in gas well, no gage, perf. 2,469-77 ft., Hockley. TD 3,205 ft. Extension and pay in Hoffman area.

M. P. S. Producing Co. 1 Margarita Garcia et al., Section 311, H&GN Sur., A-306, 6 miles northwest of San Diego. AOF 2,800 M.c.f.d., GLR 68.8 M.c.f. per bbl., 69.1°, shut-in TP 1,790 psi., perf. 4,820-23 ft., Hockley. TD 6,203 ft. New pay in Sabrina-Mag field.

Jim Hogg County:

George H. Coates 3 Virginia T. Pena, Section 578, R. L. Robinson Sur., E. Peyote Grant, 19 miles southwest of Hebbronville. AOF 3,200 M.c.f.d., dry gas, shut-in TP 1,275 psi., perf. 3,708-11 ft. TD 4,658 ft. Southeast extension and new pay discovery in El Peyote area.

Breuer & Curran Oil Co. 2 Weil Brothers, Section 243, CCSD&RGNG Sur., A-67, 18 miles south of Hebbronville. AOF 25 M.M.c.f.d., GLR 25.9 M.c.f. per bbl., 62.9°, shut-in TP 2,363 psi., perf. 6,054-58 ft., Pettus. TD 6,430 ft. New-field discovery.

Jim Wells County:

Associated Oil & Gas Co. and others 1 Fitzsimmons, Section 74, Charles D. Fitzsimmons, A-154, 8 miles west of Ben Bolt. AOF 5,400 M.c.f.d., GLR 142 M.c.f. per bbl., 62.6°, shut-in pressure 2,212 psi., perf. 5,150-65 ft., Frio, and AOF 24 M.M.c.f.d., GLR 79.4 M.c.f. per bbl., 60.2°, shut-in pressure, 2,356 psi., perf. 5,256-62 ft., Frio. TD 6,222 ft. New pays in Asoq field.

TEXAS PANHANDLE

Ochiltree County:

Shamrock Oil & Gas Corp. 1 Clarence O. Peterson, Sec. 930, Blk. 43, H&TC Sur., 6 miles southeast of Perryton. IPF 28.26 BOPD, ¾-in. choke, 39°, Mississippian 8,676-90 ft. TD 8,761 ft. Mississippian oil discovery in Barlow field.

WYOMING

Natrona County:

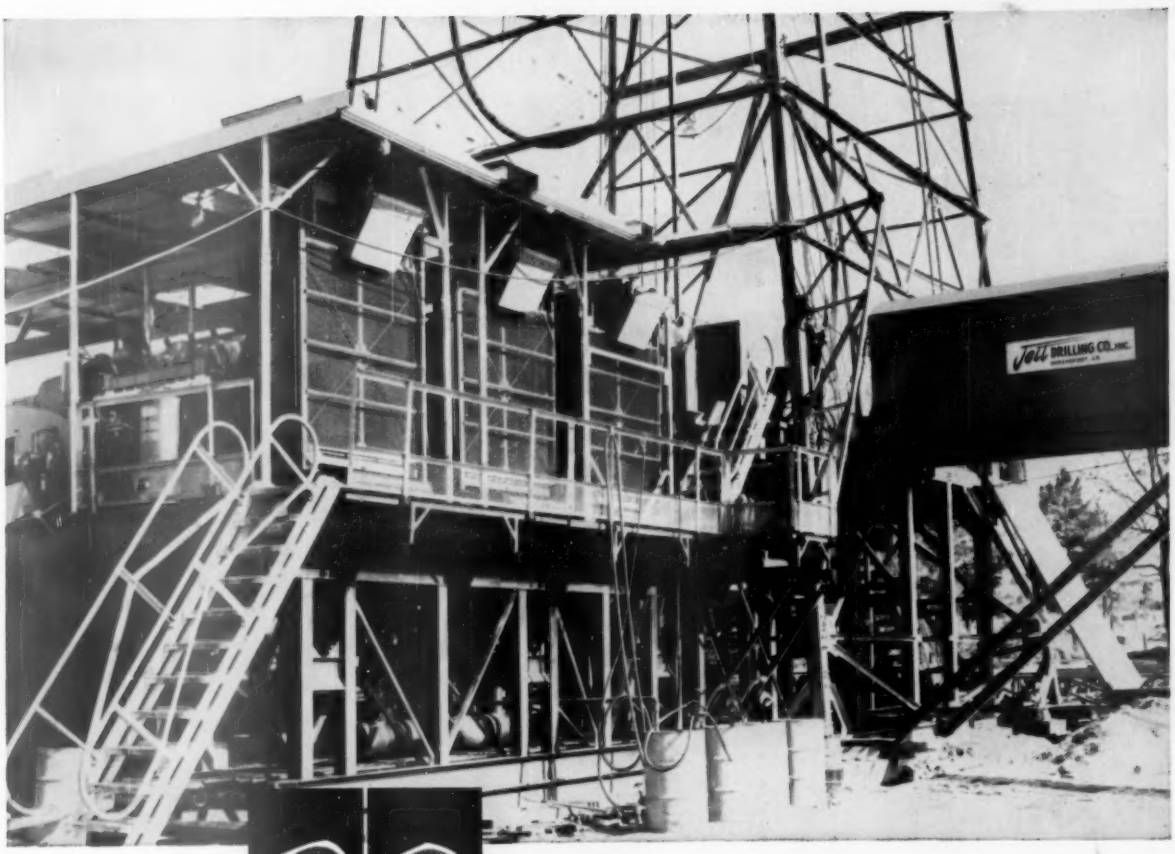
Norbert P. Juneman 1 Government, SE NW 12-39n-80w. IPP 25 BOPD, Fishtooth discovery, new field. TD 800 ft.

Sweetwater County:

Mountain Fuel Supply Co. 3 Unit, SW NW 18-13n-99w. IPF 2,530 M.c.f.d., Almond 4,833-53 ft., Almond discovery, new field. TD 7,172 ft.

Weston County:

Petroleum Inc. 1 Government-Argo, NE SE 26-45n-67w. IPF 145 BO 19 hours, 22/64-in. choke, Newcastle discovery, new pay. TD 7,120 ft. Lonetree Creek area.



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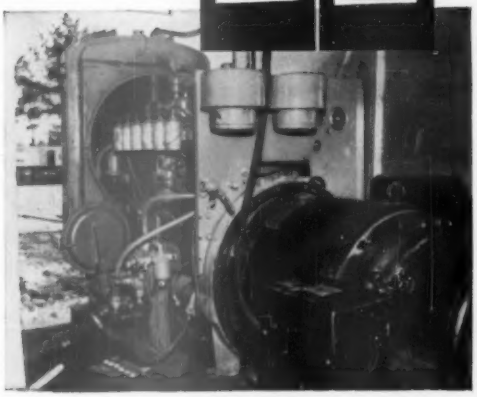
WAUKESHAS
POWER 10 DRILLING RIGS



George H. Jett, of the Jett Drilling Co., Inc., Shreveport, La., relies on Waukesha power for his extensive drilling operations in Louisiana, Mississippi, and Alabama, because he's sold on Waukesha's rugged, dependable and economical long life engine operation.

Pictured above is the Jett Rig #114, powered by three Model VLROBU Waukesha Power Units, operating on natural gas. Inset shows a Waukesha "Long Life" Model 145-GZB gas unit, powering a 50 KW generating set, to supply electric power for the rig.

On nine other drilling rigs, Mr. Jett is using ten LRDBC (Diesel); six LRZB (gas); two LRORB (gas); and one NKDBSU (Diesel). With the skid arrangement and the same crankshaft center line heights on the LRDBC, LRZB, and LROR models, the Jett crews can easily change over from gas to Diesel operation in a few hours.

Waukesha can supply your oil field power needs, too.
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464

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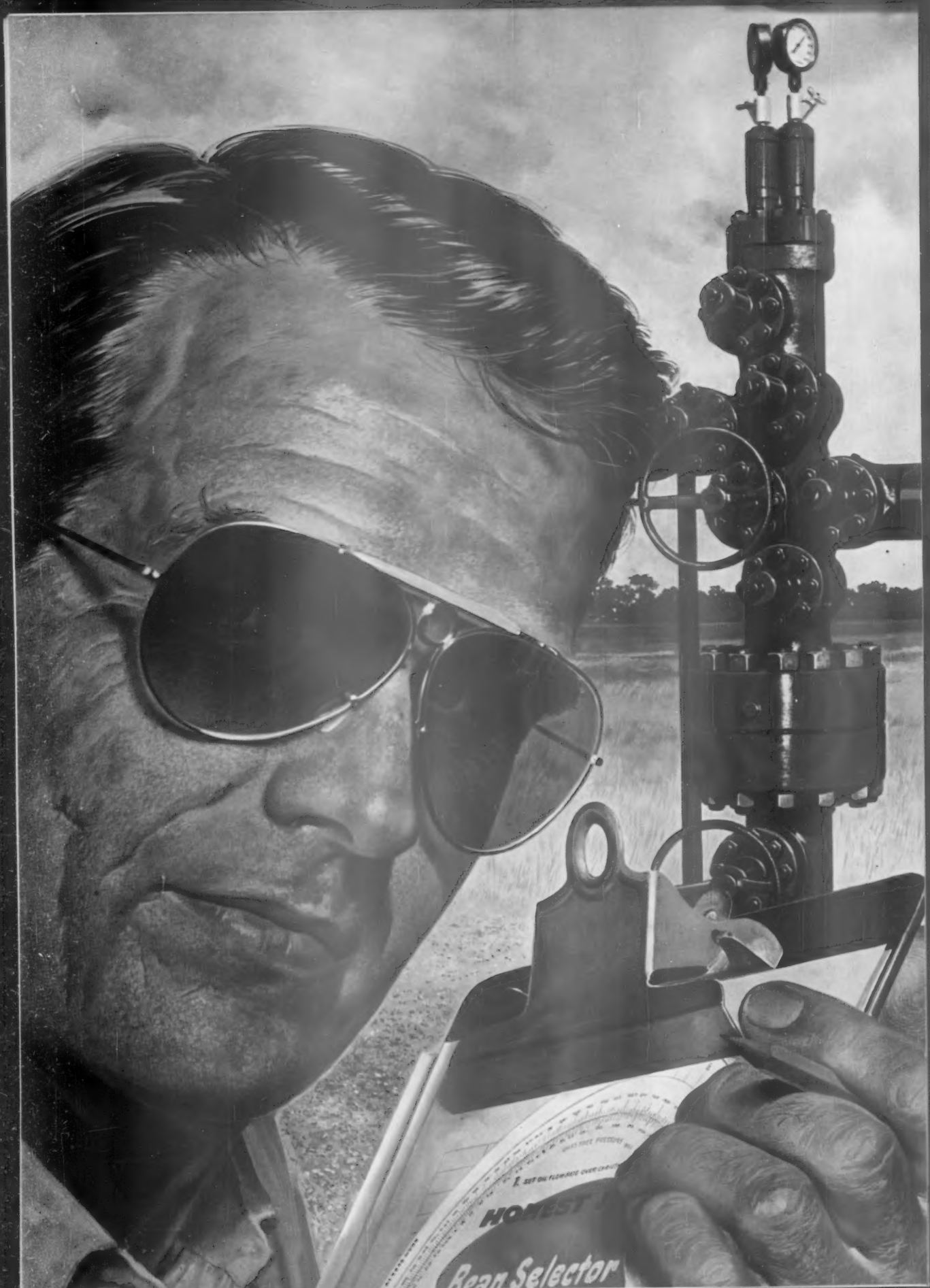
HONEST
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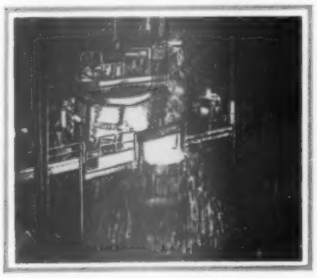
"...CAMERON TREES ARE ON TOP WITH SAFETY, SERVICE AND ECONOMY"

A Cameron Tree on top of your well means you are making the most of your investment. It means you are making possible top profits in production with safety. When you reach production zones – when the elements of drilling chance have been eliminated, doesn't it make good sense to protect your potential with the best completion equipment available?

Here's why Cameron Trees are your best buy:

SAFETY – Nothing is left to chance – we even make our own high alloy steel and forge it on presses designed especially for Cameron well head work. The most rigid inspection controls of the industry check every phase of manufacture and assembly.



SERVICE – In the field our trees do what they're supposed to do regardless of location, depth, pressure or type of flow. In ice, sand or salt spray – shallow or deep, high pressure or low, producing with abrasives or corrosives, hot or cold, in single or multiple completions, they can take it because they're designed and built that way.

ECONOMY – Almost 40 years of continuous design development experience goes into every Cameron tree. Controlling pressure and making possible the production of vast vital reserves is our business. The success of our customers all over the world means you too can get the most out of your well if you get a Cameron Tree on top.

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LOW INVENTORY
LONG LIFE
EASY MAINTENANCE
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The compact dual string Solid Block Tree Valve in our illustration is made possible by Cameron's efficient Gate Valve design. Internal components are interchangeable with other Cameron Gate Valves – all using the exclusive rotating seat design.

Each time these valves are operated a new sealing pattern is produced, efficiency is increased, valve life is extended – many times that of ordinary valves.

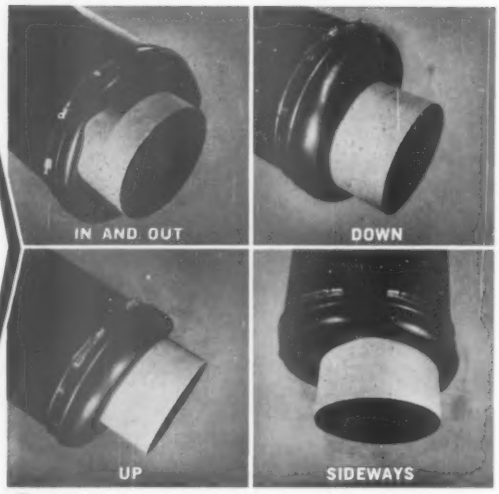
This Solid Block Tree is a Cameron development, an advancement which has brought about a practical departure from old style assemblies with their varied components. In this successful solution to the problem of reducing components we have produced a better tree. Bolted connections and the possibility of leaks are reduced to a minimum. Interesting advantages have been brought about with lighter weight, easier handling, reduced overall height and increased dependability.

NEWS FROM DOWN THE LINE!

A NEW VERSATILE AND ECONOMICAL SEAL FOR CASED CROSSINGS...

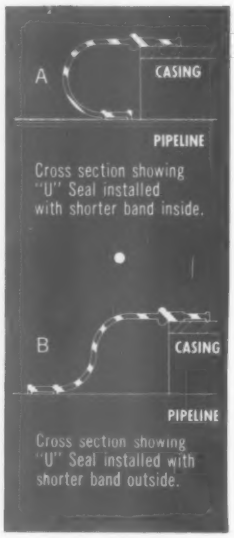
❶ "This new WmSon "U"-Seal maintains a tight seal regardless of what position the drag section assumes inside the casing."

THE NEW WmSON "U" SEAL



❷ "This is a special demonstrator to show the flexibility of the "U"-Seal. Notice how it maintains its seal regardless of the change in pipe position in relation to the casing."

❸ " . . . Here the "U"-Seal is shown installed in the new "U" shape with the shorter band inside , which allows extreme flexibility. The "U"-Seal can also be installed with the shorter band on the outside in WmSon's familiar "Z" shape. In either case, only a screwdriver is needed to tighten the two stainless steel bands."



SIZES 2" AND LARGER

❹ Regardless of which way you install the "U"-Seal (Fig. A or fig. B) . . . . Regardless of what position the drag section assumes . . .

YOU CAN SEAL WITH A "U"-SEAL!

•

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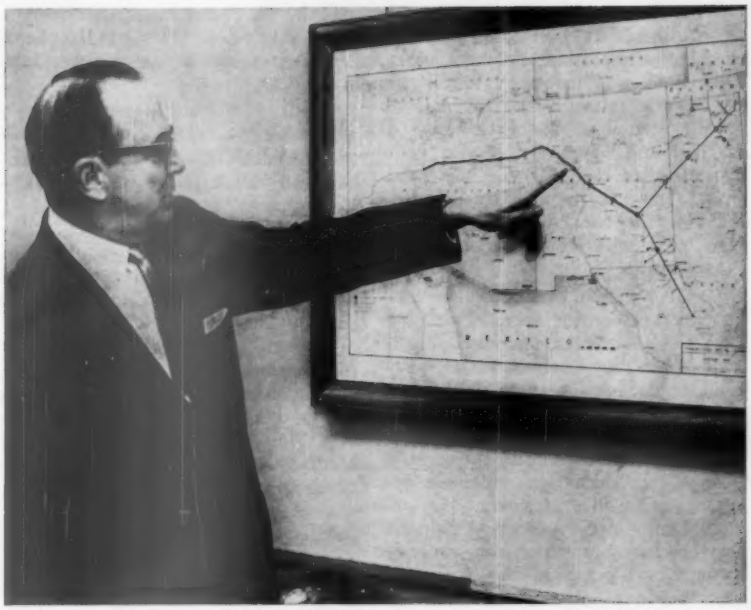
REPRESENTATIVES AROUND THE WORLD



Nelson Clegg Turner: Sees big expansion for gas transmission.

Ned Turner Faces Challenge

• He switches from building gasoline plants to heading up operations and engineering for Transwestern pipeline.

NELSON CLEGG TURNER—Ned Turner to the industry—has made a switch in mid-career that might have slowed down a less versatile man.

But to Turner it was only a slight turn in a new direction when he quit building gasoline plants in Pakistan and Chile and started laying a pipeline from Texas to California.

The changeabout, as far as Turner is concerned, is all to the good. Gas transmission certainly isn't a saturated field, and he's joined a new company that can't go anywhere but forward.

Turner moved into Transwestern Pipeline Co. last August as vice president for operations and engineering. Transwestern is building the most modern long transmission line in history—a 1,200-mile stretch of X-56 high-strength pipe that will carry, at the start, 300 million cubic feet of gas daily into the California market. The line will be the most automated in the business.

Beginnings . . . There wasn't much doubt from the start that Ned Turner would be an engineer.

His father was an engineer in Chicago where Ned was born in 1904. The family then moved to Portsmouth, Ohio, where Ned was reared.

At Ohio State University he majored in chemical engineering and earned side money playing the violin in dance orchestras. He recalls with some nostalgia his renditions of the William Tell Overture and Hearts and Flowers in the old silent movie theaters, where he and a pianist provided the musical accompaniment to the tear-jerker melodramas of the 1920's.

After graduation in 1925, he went to work for the Baltimore Gas Engineering Corp., Charleston, W. Va., an engineering contractor for gasoline-recovery plants. He started as a chemist but soon became manager of four gasoline plants in West Virginia and Kentucky.

Russian interlude . . . In 1931, Turner embarked on an adventure that gave him a personal insight into today's cold war. He went to Russia.

As a consultant to the Soviet oil trust, he helped plan gas compressor and gasoline-recovery programs at Grozny for the first Five-Year Plan of the struggling young Communist nation.

"Their methods were pretty primitive," Turner recalls, "but they were eager students. As individuals, I think they are quite capable and intelligent people.

"It is difficult for me to understand how any foreigner who has spent time in Russia could be a Communist," he adds.

While he doesn't deny the great technical advances made by the Russians, Turner says the progress has been made at the expense of the people themselves: "They don't know what luxuries are."

In his Russian job, Turner was an employe of Burrell-Mase Engineering Co., a U. S. company which had a contract with the Soviet Government.

Back home . . . After 2 years abroad, Turner came back to Pittsburgh, home of Burrell-Mase, and eventually, in 1938, moved to Tulsa where he and R. P. Mase formed Mase-Turner Engineering Co.

The firm specialized in gasoline plants, gas-compressor stations, and refinery processing.

In 1942 Mase-Turner was absorbed by the Engineering Construction Division of Jones & Laughlin Steel Corp., and Turner stayed with the division through World War II as chief process engineer and then chief engineer.

He spent much of his time building 100-octane aviation gasoline plants for the Defense Plant Corp.

In 1947, Turner joined Hudson Engineering Corp. in Houston and soon became a vice president. He handled much of Hudson's foreign business of designing and installing gas treating, gas compressor, and light hydrocarbon processing plants.

His duties took him to such out-of-the-way spots as Tierra del Fuego, on Chile's southern tip.

To Transwestern . . . Turner had long been acquainted with the founders of Transwestern Pipeline, and when they approached him on moving into the new Houston company, he accepted the challenge.

He had helped in the design of transmission lines in the past and knew many of the problems related to the business.

Currently his main task is to direct and work with Gulf Interstate Co., the engineering contractor on the job.

Transwestern will complete the line by July 1, barring any exceptional run of bad weather. Construction is a little ahead of schedule.

Turner will be proud, when the job is finished, to have a line that is built more economically and can be maintained more economically than any other line in history. Operational costs will be lower because a single dispatcher in Roswell will be able to control movements at any of the five, and eventually 14, stations along the line.

As for the future, Ned Turner knows the company won't stand still.

▶▶▶ Personals

Glynne J. Evans, formerly pipeline superintendent for Texaco Exploration Co., has been elected vice president and general manager of Trans-Northern Pipe Line Co., Toronto. As general manager, he succeeds **L. R. Dickinson,** president, who has retired because of poor health. Trans-Northern is jointly owned by British American Oil Co., Ltd., Texaco Canada, Ltd., and Shell Oil Co. of Canada, Ltd. Dickinson had been president of Trans-Northern since 1955. He was vice president and general manager before that time.

EVANS

Lloyd R. Austin, formerly manager of administration for the northern region of Standard Oil Co. (Ind.), in Milwaukee, has been named assistant general manager, operations and administration, in the marketing department of American Oil Co. He will headquarter in New York.

Harry W. Dudley, manager of petrochemicals for Delhi-Taylor Oil Corp., has been transferred to company headquarters in Dallas from the New York sales office. **Albert J. Gnesin** will continue as eastern district petrochemical sales manager in New York.

Richard J. Plank has been elected a director of Consolidated Natural Gas Co. and president of New York State Natural Gas Corp., a Consolidated system subsidiary. He succeeds **Fenton H. Finn,** who has retired. Finn will continue as a consultant to Consolidated system companies. Plank was formerly executive vice president and a director of New York Natural.

Dr. George H. Fancher, chairman of the petroleum engineering department of the University of Texas, has joined Sinclair Research Laboratories, Inc., as vice president in charge of the production research department in Tulsa. **Dr. H. H. Power** will become acting department chairman at the university. Fancher has been consultant to the Venezuelan, Colombian, and Canadian governments and to several U. S. companies. He is a member of the Interstate Oil Compact Commission and was instrumental in setting up the Texas Petroleum Research Committee.

W. E. Winn will continue as Southern Natural Gas Co.'s vice president in charge of exploration and production. The name was incorrectly listed as W. E. Dunn in last week's Journal.

Charles K. McCully, Connecticut district sales manager for Gulf Oil Corp., has been named district sales manager for New York City in the New York sales division.

E. W. Christian, vice president and general manager of Imperial Pipe Line Co., Ltd., has been appointed president of the Pipe Liners Club of Western Canada.

Carl T. Swan, assistant superintendent of the Lockport, Ill., refinery of Texaco Inc., has been appointed assistant to the vice president. He will headquarter in New York. **David K. Beavon,** assistant supervisor, process, in the New York process and production division, will succeed Swan in Lockport.

Darwin W. Ferguson, manager of Sun Oil Co.'s southeastern sales region, Jacksonville, Fla., has been elected president and a director of Sun Oil Co., Ltd., Toronto, a subsidiary. He succeeds **Wilburn T. Askew,** who has returned to the parent company in Philadelphia. Askew will continue with Sun Oil, Ltd., as a vice president.

Robert R. Garrison, formerly assistant sales manager with Suntide Refining Co., has joined Monsanto Chemical Co.'s Lion Oil Division as director of refinery sales, a new position. He will direct sale of all refinery products in bulk except for those marketed through the branded-sales section and the independent station sales section.

Sinclair Oil & Gas Co. will close its Odessa, Tex., production district and open new district offices in Monahans and Andrews, Tex. The change will locate district offices closer to production operations in West Texas. **Les Sellers,** formerly assistant district production superintendent in Hobbs, N. M., will be in charge of the Monahans district. **Fred Burns** will be district superintendent in charge of the Andrews office.

J. J. Tanner, Phillips Petroleum Co.; **H. I. Harris,** Magellan Petroleum Corp.; and **D. M. Traves,** of the local Mines Administration have been elected officers of the Queensland Petroleum Exploration group (QUPEX), recently organized in Brisbane, Australia. Purpose of the group is to encourage exploration in the Great Artesian basin area of Queensland.

S. B. Steincamp, mechanical engineer with Shell Oil Co., has been named production foreman in Quitman, Tex.

Richard M. Martin, gas engineer with Mobil Oil Co. in Ulysses, Kans., has been transferred to Claflin, Kans., as production engineer.

Dr. Robert Foreman has been promoted to senior research associate at the Cleveland research center of Standard Oil Co. (Ohio).

Emerson H. Clark, general manager of Engineering-Construction Co., Tulsa, has been promoted to vice president. He succeeds **Daniel R. Toll,** who becomes chairman of the executive committee. Engineering-Construction is a subsidiary of Helmerich & Payne, Inc.

Leslie W. Hicks, assistant director of engineering-construction for American Oil Co., has been appointed chief refinery engineer at the Yorktown, Va., refinery. **James F. Mandell,** section head in general engineering, will succeed Hicks. **Paul J. Hurd,** formerly in the Yorktown plant engineering department, has been transferred to Texas City as section head, process facilities, in the general engineering department. Hicks has been with Amoco since 1948. He was senior engineer in Yorktown before assignment as assistant director, engineering-construction, in Texas City 3 years ago.

HICKS

J. Merle Brewer has been named district superintendent in Ada Oil Co.'s new Wichita Falls, Tex., district production office. Brewer moves to Wichita Falls from Abilene, Tex. The Abilene office will be closed.

Seven division sales managers have been appointed for Union Oil Co.'s marketing divisions. They include **W. I. Martin,** Northwest division, Seattle; **J. E. McCaffrey,** Oregon division, Portland; **J. J. Grunewald,** California north coastal division, San Francisco; **W. M. McClure,** California central division, Sacramento; **E. Kendall, Jr.,** California south coastal division, Los Angeles; **R. Brenchley,** southwest-mountain division, Phoenix; and **R. H. Rath,** Hawaii division, Honolulu. Also, **W. L. Spencer** has been named general manager of national and special accounts with headquarters in Los Angeles.

Henry J. Geremia has been appointed engineering associate for Esso Research & Engineering Co.

P. F. Cochran, production engineer with Pure Oil Co., has been transferred to Olney, Ill., from Newark, Ohio.

N. S. Banta, Jr., petroleum production engineer for Gulf Oil Corp., has been transferred to Crane, Tex., from Monahans, Tex.

Marvin B. Smith, formerly engineer trainee with Ohio Oil Co., has been promoted to reservoir engineer and transferred to Midland, Tex., from Hobbs, N. M.

Maston Nixon, president of Southern Minerals Corp. and its subsidiary, Southern Pipe Line Corp., has moved up to chairman of the companies. He will continue as chief executive officer. **Frank P. Peterson,** executive vice president of the companies, has been elected president and a director. Nixon has managed the companies since 1932. Peterson joined Southern Minerals in 1936.

James C. Vandiver, El Paso Natural Gas Products Co., has been elected president of the Four Corners Landmen's Association. Other new officers include **Bryan Burk,** Atlantic Refining Co., and **C. V. Healy,** Amerada Petroleum Corp., vice presidents; **Darrell N. Canfield,** El Paso Natural Gas, secretary; and **Richard A. Wolgast,** Phillips Petroleum Co., treasurer.

D. F. Clugston, formerly division sales manager in Champlin Oil & Refining Co.'s Omaha marketing division, has joined Vickers Petroleum Co., Inc., as division sales manager in the company's new Nebraska-Iowa sales division, Omaha. **Richard S. Westin** and **Edward W. Bevans** will be sales representatives for Vickers in the area.

Edward C. Dorroh, president of Tradewinds Exploration, Inc., Denver drilling and overseas exploration firm, has been named president of Warren-Bradshaw Drilling Co., Tulsa. He will continue as president of Tradewinds and its Roden & McRae drilling division. In other Warren-Bradshaw changes, **R. B. Warren, Jr.,** chairman and founder of Warren-Bradshaw Exploration Co., has left the company to devote full time to personal interests. **Bryce Crider,** secretary-treasurer, has been elected vice president and treasurer. **Tom Kerlin,** contract representative, has been named a vice president.

F. Ward O'Malley, formerly with Tidewater Oil Co. in Turkey, has joined Iran Pan American Oil Co. as exploration manager.

Ted Weiner, general partner of Texas Crude Oil Co. and president of Coral Drilling Co., has been elected a director of Landa Oil Co., Dallas.

Tennant Brooks will be in charge of the new Lexington, Ky., geological office of Ferguson & Bosworth, Bakersfield, Calif., independent firm.

James Acquaviva has been named an engineering associate for Esso Research & Engineering Co. Acquaviva is currently on assignment with the company's European office in The Hague.

Norman C. Knapp, Mobil Oil Co.'s Wichita district geologist, will supervise activities formerly handled from the Mt. Vernon, Ill., office. Mt. Vernon operations have been moved to Wichita.

Walter B. Oslund, vice president, administration, for Franklin County Coal Corp., a subsidiary of Chemoil Industries, Inc., has been elected vice president and general manager. Franklin County has pipeline operations in Wyoming through its subsidiary, Plains Pipe Line Co., and owns production interests in Illinois.

Charles S. Agey, manager of Amerada Petroleum Corp.'s Canadian division, has been named chief geologist of the company. He succeeds **J. F. Hosterman,** who will retire March 1 after almost 40 years with the company. **Kenneth G. Reed,** manager of the land department in the Canadian division, will succeed Agey as division manager.

Dr. Adolph I. Snow has been named director of the new radiation division of Sinclair Research Laboratories, Inc. Snow joined Sinclair as a section leader in the catalysis research division in 1952. Recently he has worked with Sinclair's radio-active tracer program studying the effects of radiation on petroleum products and processes.

Frank Allen Upson has been named manager of engineering for Amoco Chemicals Corp. and will be responsible for engineering and construction of new plant facilities and other major projects. Upson was formerly chief engineer in the process engineering division, general engineering department, at the Whiting, Ind., refinery of Standard Oil Co. (Ind.). Amoco is an Indiana Standard subsidiary.

▶▶▶ Personals

Ben H. Parker, vice president and a director of Frontier Refining Co., has been elected president of American Association of Petroleum Geologists. Parker succeeds **Lewis G. Weeks,** Westport, Conn., consultant, on April 28. Other new AAPG officers are **Frank B. Conselman,** Abilene, Tex., consultant, vice president; **George V. Cohee,** U. S. Geological Survey, Washington, secretary - treasurer; and **Grover E. Murray,** Louisiana State University professor of geology, editor. Weeks, outgoing president, will serve on the executive committee along with new officers. Parker is a former president of Colorado School of Mines and has been president of the school's board of trustees since 1957. He became vice president of Frontier in 1942 and a director in 1951.

PARKER

Russell B. Lennon, exploitation engineer with Shell Oil Co., has been transferred to Denver from Sterling, Colo.

Dr. Juan Jones Parra, Jr., formerly head of the Venezuelan Government's Escuela Tecnica Industrial, has joined Mobil Oil Co. de Venezuela. He will be on temporary assignment with Mobil Oil Co. in the United States.

R. H. Rainey has been named to succeed **J. W. Thomas** as manager of marketing for Geophysical Service, Inc. Thomas, a vice president of the company, will retire later in the year. Rainey was formerly GSI Far East operations manager in Singapore. **John McCormack** has been named an assistant vice president of the company and will continue as controller.

John R. Hodson and **Erhart K. Drechsel** have been appointed associate directors in the development department of Texas Butadiene & Chemical Corp. They will headquarter in New York. Drechsel comes to the post from Escambia Chemical Corp. Hodson has been with Texas Butadiene's process economics and development departments. **Ernest W. Kirchheimer,** process engineer in Texas Butadiene's Channelview, Tex., plant, has been appointed senior process economist, development department. He also will headquarter in New York.

Personals

Bill Bell, formerly with Midwest Oil Corp. in Denver, has joined W. C. McBride, Inc., as geologist in Denver.

Russell L. Lindvall, field engineer with British-American Oil Producing Co. in Kimball, Neb., has been transferred to Denver as staff engineer.

R. E. Doe, staff geophysicist with Chevron Oil Co. in Houston, has been transferred to the La Habra, Calif., laboratory of California Research Corp. as geophysics associate, applied geophysics. Doe has been with Standard Oil Co. of California and its subsidiaries since 1948.

Howard K. Edwards, formerly secretary-treasurer of Atlas Exploration Co., Tulsa, has been elected president of the company. He succeeds **Albert C. Johnson,** who has resigned as president but will continue as a director. **A. N. Edwards** will succeed H. K. Edwards as secretary-treasurer. **Jack N. Hays,** Tulsa, has been named assistant secretary and general counsel. Board membership has been increased to eight with addition of **R. L. Davisson, Jr.,** and **Paul C. Cabot, Jr.,** Boston; and **J. H. McClure,** Pawhuska, Okla. **J. A. Berry** will continue as vice president in charge of production.

Fred C. Brechtel, vice president of Geophoto Services, Ltd., Calgary, has been elected executive vice president and a director of Geophoto Services, Inc., Denver. **Jerald Alliger** has been named vice president and a director of Geophoto Services, Inc.

Weston Payne, vice president in charge of production for Anderson-Prichard Oil Corp., has retired after 29 years with the company. Payne was production manager before being elected vice president for production in 1946.

Kenneth Walleen has joined Arrowhead Exploration Co., Denver, as production assistant in Columbus, N. D. **L. Dean Burgess,** formerly production foreman in Fort Morgan, Colo., has been transferred to Denver. **David J. Pape** will be production assistant in Fort Morgan, and **Donald G. Curtis** is production assistant in Shreve, Ohio.

A. M. Stafford, vice president and a director of Sinclair Pipe Line Co., has retired after 41 years with the company and its affiliates. Stafford had been assistant to Sinclair Oil Corp.'s vice president in charge of pipelines and production and New York representative for the parent company's pipeline department before moving to Sinclair Pipe Line.

J. E. McGeath, assistant manager of Magnolia Pipe Line Co., has been named manager of operations for the company, which has been expanded by consolidation with Mobil Oil Co.'s three pipeline divisions. In other appointments, **S. L. Westlake,** formerly manager of civil and mechanical engineering for Magnolia, has been appointed manager of pipeline development. **C. M. Brecheisen,** formerly manager of Mobil Oil's eastern pipeline division, Plainfield, N. J., has been named manager of engineering for Magnolia. They will headquarter in Dallas.

McGEATH

K. F. Maloney, superintendent, oil manufacturing, for Arabian American Oil Co. in Ras Tanura, has been appointed chief engineer for the company. **R. W. Ryrholm,** formerly superintendent of the oil handling division, oil operations department, will be superintendent of oil manufacturing. **V. A. Cornell,** operating foreman in the oil manufacturing division, has been appointed superintendent, oil handling. Maloney and Ryrholm have been with Aramco since 1949. Cornell joined the company in 1951.

Deaths

William F. Humphrey, 86, retired president of Tidewater Oil Co. and predecessor firms, died February 3 in San Francisco. Humphrey retired as Tidewater president in 1953.

A. H. (Ajax) Carson, 72, founder and chairman of Carson Machine & Supply Co., Oklahoma City, died January 25 after a long illness. Carson was with Humble Oil & Refining Co. as a drilling superintendent before joining Ajax Iron Works. While he was with this company it developed and marketed the Ajax-Carson lubricator, the source of his nickname. Carson founded Carson Machine & Supply in 1929.

Ben (Bud) Coyle, 82, pioneer Texas oil man, died January 26 at his home in Houston. Coyle became an oil driller in Spindletop soon after its discovery in 1901. He began independent operations in 1921.

Barney B. Hayes, 64, Oklahoma City independent operator, died February 1 in Oklahoma City after a heart attack. Hayes was with Skelly Oil Co. before becoming an independent.

Luther Whetstone, 67, retired Drumright, Okla., office manager for Parkersburg Rig & Reel Co., died January 30 at his home in Tulsa. Whetstone retired in 1957 after 40 years with the company.

A. C. Hartley, 71, former assistant manager of the engineering department of the old Anglo-Iranian Oil Co., now British Petroleum, died January 28 in a London hospital. Hartley helped develop Pluto, the undersea pipeline which carried gasoline to Allied invasion forces in France, and Fido, a system which dispersed fog over bomber airfields during World War II. He was a past president of the Institution of Mechanical Engineers and the Institution of Civil Engineers.

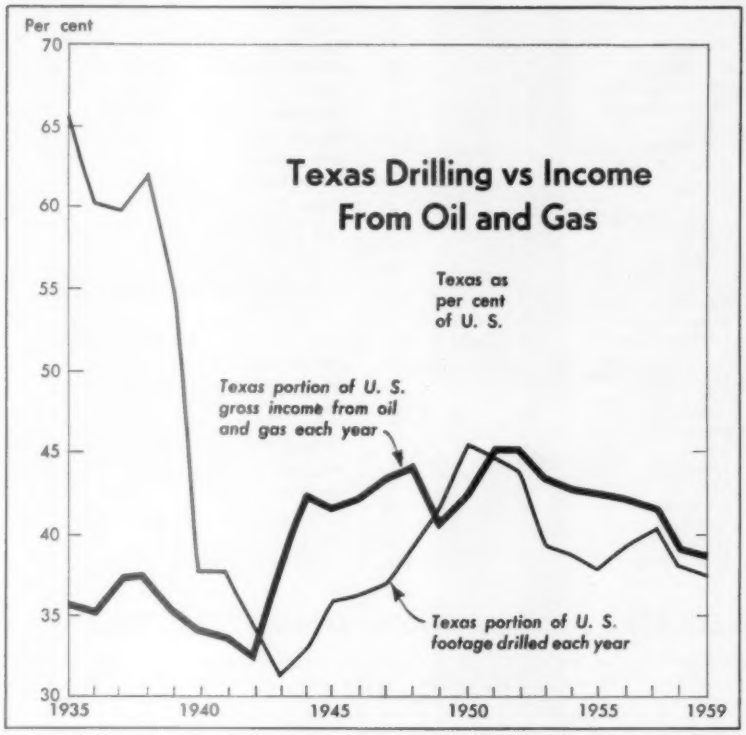
Karl P. Fischer, 68, Kansas independent operator, died January 31 in a Wichita hospital.

J. Lloyd O'Donnell, 59, Long Beach, Calif., independent, died January 25 in a Long Beach hospital after a heart attack. O'Donnell was also known for his activities as an aviator and big game hunter. He had headed the J. L. O'Donnell Oil Co. in Long Beach since 1930.

John P. Main, 63, secretary-treasurer of Sinclair Pipe Line Co., died January 31 after a heart attack. He had been with Sinclair and predecessor companies for 44 years.

Edward D. McElvain, 53, legal representative for Phillips Petroleum Co. in Washington, died January 31 in Washington. He had been with Phillips since 1930.

Carlos E. Sampson, 76, pioneer California oil man, died January 31 at his home in San Marino, Calif. Sampson had been secretary-treasurer of Kettleman North Dome Association, a partner in Pipe Fabricating & Supply Co. and was with the old General Petroleum Corp.



How flow of capital affects the drilling rate

BY JOHN C. CASPER

BACK IN 1935, drilling in Texas accounted for about 65% of all the footage cut in this country that year. This was a period of development for some of the important discoveries in that state, but the state's portion of the national total began to drop off before the start of World War II.

The chart above indicates a big flow of capital into Texas drilling in the 1935-39 period. The two lines on the chart show the Texas portion of national totals each year for both footage drilled and gross income from oil and gas.

On a national basis, drilling in any year depends on the money available that year. Since most of the capital for drilling comes from producers' sales of oil and gas, total footage for a given year tends to vary with gross income from crude and natural-gas sales. If the comparison covers a period of several years, income figures have to be adjusted for changes in the value of the wholesale dollar.

In addition to changes in income from sales, footage will vary with the flow of capital into or out of the drilling-producing segment of the oil industry. There was a steady flow of outside capital into drilling-production in the early years of the past decade. The result was a period of sharp annual increases in drilling. In recent years, the flow of funds to exploration and drilling in foreign areas has tended to limit total drilling in this country.

This same capital-footage relationship also holds for certain producing areas within the country. The very high percentage of footage credited to Texas in the 1935-38 period compared with the state's portion of income from oil and gas gives some indication of the flow of outside funds into Texas during that period.

This big drilling program of the thirties resulted in very large gains in crude-producing capacity in Texas. This reserve producing capacity was a blessing for it helped meet demand during World War II and in the years just after the war.

This big demand during a period when material shortages limited drilling accounts for the fact that the Texas portion of income from oil and gas far exceeded that state's portion of footage in the 1943-48 period.

Note the sharp drop in the state's portion of income for the year 1949. The number of producing days in Texas was cut to 239 that year. For the period 1949-52, Texas drilling tended to follow income. Part of the big gain in footage was due to the boom from Scurry and Spraberry.

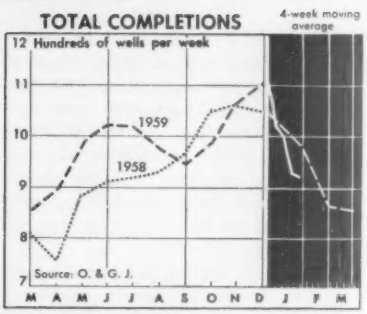
The drop in Spraberry drilling shows up as a smaller percentage of the national footage total in 1953. Drilling remained low compared with income until 1957, and the gain by the footage line in 1957 shows that Texas footage did not drop as much as the national total that year.

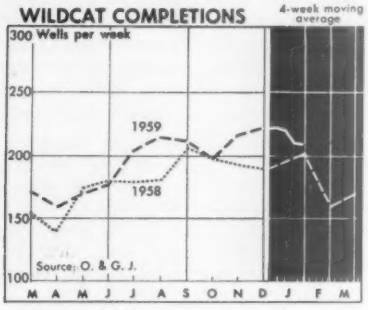
Footage and income for Texas have tended to follow similar patterns for the past 3 years.

A quick look at the highlights

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,140,920	DOWN	49,060	DOWN	80,740
Crude stocks	248,708,000	DOWN	1,305,000	DOWN	9,213,000
Completions	820	DOWN	16	DOWN	46
Refinery runs	8,149,000	DOWN	78,000	UP	9,000
Gasoline stocks	203,184,000	UP	3,279,000	UP	5,673,000
Kerosine stocks	25,025,000	DOWN	841,000	UP	4,115,000
Distillate stocks	126,485,000	DOWN	6,153,000	UP	29,740,000
Residual stocks	47,929,000	DOWN	2,160,000	DOWN	9,938,000
Four-product stocks	402,623,000	DOWN	5,875,000	UP	29,590,000
Total imports	2,178,600	UP	368,800	UP	155,800

DRILLING





Active Rotary Rigs

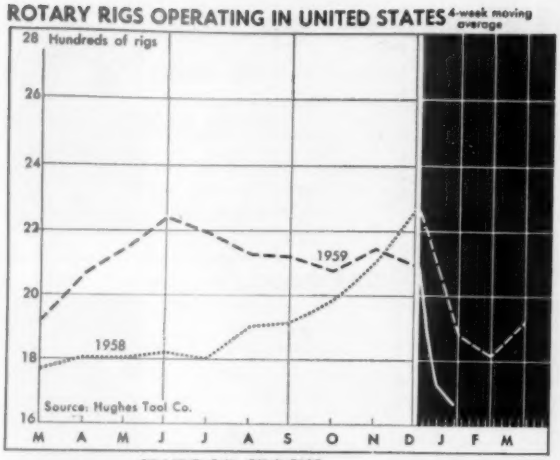
	2-1-60	1-25-60	2-2-59
Alabama	4	5	8
Arkansas	13	11	16
Arizona	0	0	0
California	69	67	76
Land	64	61	72
Offshore	5	6	4
Colorado	27	29	22
Florida	2	2	1
Land	1	1	1
Offshore	1	1	0
Illinois	24	18	20
Indiana	7	3	4
Iowa	1	1	3
Kansas	117	100	118
Kentucky	10	8	5
Louisiana	288	287	305
North	35	32	36
S. Inland waters	113	114	132
S. Land	89	85	101
Offshore	51	56	36
Maryland	0	0	2
Michigan	35	36	11
Mississippi	72	72	55
Missouri	1	1	0
Montana	10	15	16
Nebraska	19	16	25
Nevada	0	0	0
New Mexico	96	97	101
New York	0	0	0
North Dakota	19	24	29
Ohio	2	4	2
Oklahoma	177	169	177
Oregon	0	0	0
Pennsylvania	11	14	11
South Dakota	3	4	1
Texas	611	553	692
S. Inland waters	6	7	7
S. Land	173	157	146
Offshore	0	0	1
North-East	133	113	154
West Central	211	181	251
West	88	95	133
Utah	28	28	28
Washington	1	1	1
West Virginia	3	4	2
Wyoming	60	54	50
Total U. S.	**1,710**	1,623	1,781
Western Canada	240	241	215
Eastern Canada	4	4	0
Grand total	1,954	1,868	1,996

*Hughes Tool Co. report.

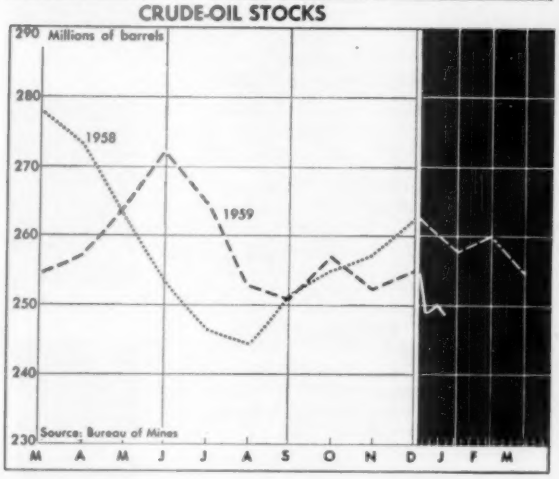
WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 30, 1960

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1960	1959	Total	Crude	Cond.	Gas	Dry	1960	1959
Alabama	2	2	0	0	0	0	14,865	5	17	0	0	0	0	0	0	2
Arizona	0	0	0	0	0	0	0	5	....	0	0	0	0	0	5	....
Arkansas	13	7	0	0	6	0	54,527	52	96	4	0	0	0	4	14	23
California	13	8	0	1	4	0	55,542	135	156	4	0	0	1	3	34	38
Colorado	17	2	1	5	9	0	97,792	65	72	7	0	0	2	5	34	36
Illinois	50	15	0	0	23	12	99,674	213	234	13	2	0	0	11	52	40
Indiana	24	11	0	0	13	0	31,226	90	66	7	0	0	0	7	30	19
Kansas	68	38	0	3	26	1	236,449	310	402	18	6	0	0	12	96	102
Kentucky	37	16	0	16	5	0	68,804	209	150	2	1	0	0	1	25	12
Louisiana	74	39	5	3	26	1	623,535	323	352	10	1	0	1	8	44	55
North	31	22	0	3	6	0	96,074	110	130	3	0	0	1	2	19	26
South	34	12	4	0	17	1	442,622	161	187	7	1	0	0	6	24	28
Offshore	9	5	1	0	3	0	84,839	52	35	0	0	0	0	0	1	1
Michigan	7	2	0	0	5	0	22,971	66	58	4	0	0	0	4	24	20
Mississippi	12	6	1	0	5	0	123,256	69	77	3	0	0	0	3	24	38
Montana	13	3	0	1	9	0	51,943	32	28	6	0	0	1	5	16	7
Nebraska	10	4	0	0	6	0	62,515	68	59	2	0	0	0	2	25	26
New Mexico	39	18	3	5	13	0	169,260	190	146	10	0	0	0	10	28	18
West	12	2	1	5	4	0	40,819	67	....	3	0	0	0	3	6	....
East	27	16	2	0	9	0	128,441	123	....	7	0	0	0	7	22	....
New York	0	0	0	0	0	0	0	25	33	0	0	0	0	0	2	1
North Dakota	4	3	0	0	1	0	27,737	27	39	0	0	0	0	0	5	9
Ohio	20	12	0	5	3	0	55,951	126	66	1	1	0	0	0	4	2
Oklahoma	84	31	1	11	40	1	370,293	346	495	23	0	0	3	20	74	93
Pennsylvania	0	0	0	0	0	0	0	6	0	0	0	0	0	0	2	0
South Dakota	0	0	0	0	0	0	0	2	....	0	0	0	0	0	2	....
Texas	281	153	11	15	99	3	1,256,346	1,616	1,872	54	4	2	0	48	338	372
District 1	16	7	0	1	8	0	43,081	118	157	8	1	0	0	7	45	36
District 2	5	1	1	0	3	0	27,003	69	80	2	0	0	0	2	18	24
District 3	17	9	1	2	5	0	96,303	147	105	4	0	1	0	3	26	33
District 4	12	2	4	4	2	0	76,293	153	148	3	0	1	0	2	39	45
East	25	12	0	0	13	0	117,661	137	109	5	1	0	0	4	35	28
District 7-B	45	17	1	0	27	0	124,794	198	236	9	1	0	0	8	59	72
West	94	65	2	3	24	0	545,356	459	576	16	1	0	0	15	62	68
District 9	38	18	1	1	15	3	100,125	259	334	6	0	0	0	6	49	55
District 10	29	22	1	4	2	0	125,730	76	127	1	0	0	0	1	5	11
Utah	7	0	0	3	4	0	31,383	25	33	3	0	0	0	3	11	8
West Virginia	17	0	0	16	1	0	53,331	62	68	0	0	0	0	0	1	2
Wyoming	28	10	0	3	15	0	135,490	92	80	9	0	0	0	9	43	32
Miscellaneous	0	0	0	0	0	0	0	12	11	0	0	0	0	0	11	8
Total U. S.	**820**	380	22	87	313	18	3,642,890	4,171	4,610	**180**	15	2	8	155	944	963
Prev. week	836	440	16	42	329	9	3,342,998	.....	.....	190	16	0	2	172	.....	.....
Cum. 1960	4,171	1,960	161	326	1,612	112	18,380,069	.....	.....	944	79	12	26	827	.....	.....
Cum. 1959	4,610	2,296	124	283	1,796	111	19,579,138	.....	.....	963	88	13	31	831	.....	.....
Western Canada	59	36	0	6	17	0	321,030	147	130	17	3	0	3	11	38	37

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	1-23-60	1-16-60	1-24-59
Pennsylvania	2,287	2,263	2,517
Other Appalachian	2,058	2,024	1,476
Illinois, Indiana, Michigan	9,426	9,783	9,605
Nebraska and North Dakota	2,690	2,679	2,205
Kansas	9,324	9,905	9,522
Oklahoma	16,574	17,089	16,665
Arkansas	2,139	2,254	2,144
Louisiana	18,094	18,289	17,033
North	3,072	3,194	3,059
South	15,022	15,095	13,974
Mississippi, Alabama, Florida	2,571	2,606	2,472
New Mexico	7,693	8,105	9,075
Texas	107,261	106,651	115,171
East Texas	8,015	7,785	8,426
West Texas	49,924	50,171	56,335
Texas Gulf	19,937	19,167	20,258
Other Texas	29,385	29,528	30,152
Wyoming	17,269	16,801	13,553
Other Rocky Mountain	9,243	9,464	9,201
California	28,261	28,511	34,004
Foreign	†13,818	13,589	13,278
Total	248,708	250,013	257,921

*Bureau of Mines. †Includes 3,822,000 bbl. in California.

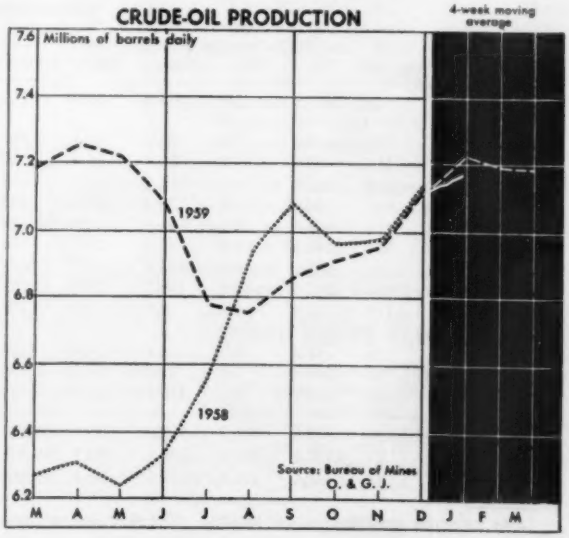
DAILY AVERAGE PRODUCTION FOR WEEK

	January 30, 1960			Jan. 23
	Crude oil	Lease condensate	Total	total
Alabama	19,130	.....	19,130	16,400
Arkansas	80,100	230	80,330	80,500
California	836,700	.....	836,700	835,100
Colorado	128,400	.....	128,400	129,100
Eastern	42,400	.....	42,400	41,600
Florida	1,150	.....	1,150	1,150
Illinois	217,300	.....	217,300	217,200
Indiana	32,700	.....	32,700	31,800
Kansas	†288,390	.....	†288,390	†317,360
Kentucky	67,900	.....	67,900	75,000
Louisiana	948,000	123,450	1,071,450	1,071,300
North	108,000	5,950	113,950	113,800
South	840,000	117,500	957,500	957,500
Michigan	33,100	.....	33,100	33,000
Mississippi	141,850	4,870	146,720	146,720
Montana	81,100	.....	81,100	81,400
Nebraska	63,100	.....	63,100	62,700
Nevada	100	.....	100	100
New Mexico	292,600	6,800	299,400	299,400
North Dakota	60,100	.....	60,100	59,000
Oklahoma	†550,300	.....	†550,300	†570,600
Texas	2,584,000	81,000	2,665,000	2,665,000
Dist. 1	40,000	3,000	43,000	43,000
Dist. 2	112,000	8,900	120,900	120,900
Dist. 3	340,000	37,000	377,000	377,000
Dist. 4	179,000	9,800	187,800	187,800
Dist. 5	27,000	400	27,400	27,400
Dist. 6	111,000	9,400	120,400	120,400
East Texas Field	142,000	.....	142,000	142,000
Dist. 7-B	135,000	180	135,180	135,180
Dist. 7-C	123,000	3,620	126,620	126,620
Dist. 8	1,074,000	5,200	1,079,200	1,079,200
Dist. 9	193,000	2,100	195,100	195,100
Dist. 10	108,000	1,400	109,400	109,400
Utah	108,900	.....	108,900	111,400
Wyoming	346,800	.....	346,800	343,700
Others	‡450	.....	‡450	‡450
Total U. S.	6,924,570	216,350	**7,140,920**	7,189,980
Change from prev. week, down			**49,060**	
Canada	†609,800	.....	†609,800	627,700

Total U. S. prod., Jan. 1-Jan. 30 ..... 214,886,240 bbl.
Same period last year (crude plus cond.) ..... *216,704,339 bbl.

*Includes 6,192,650 bbl. condensate. †Week ended previous Monday. ‡Arizona, South Dakota and Washington.

CRUDE-OIL PRODUCTION



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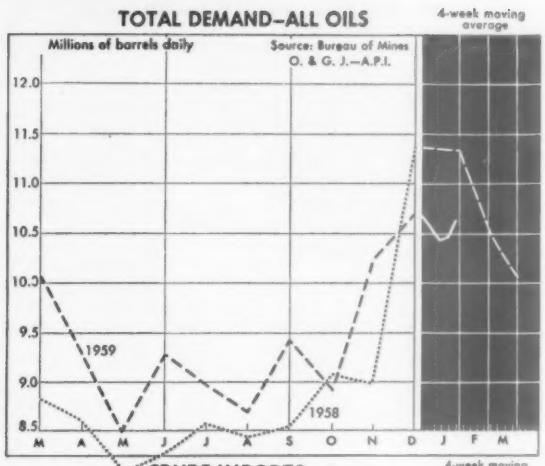
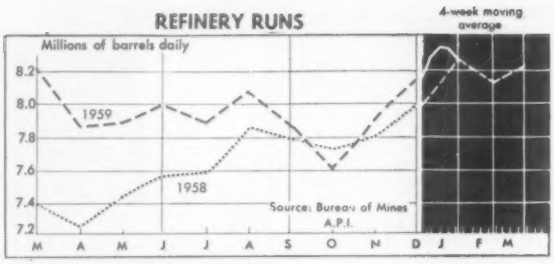
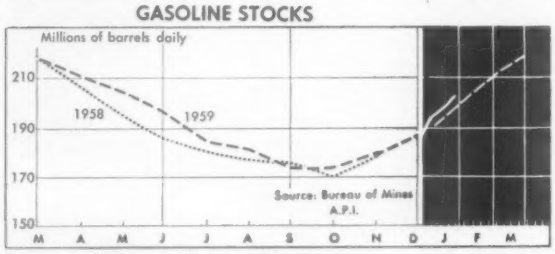
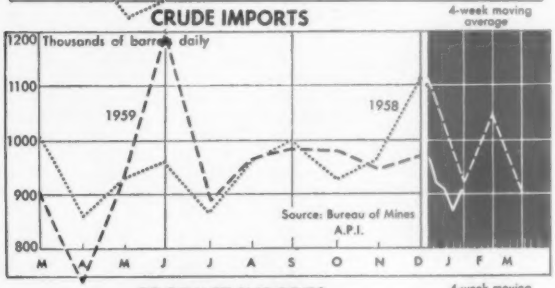
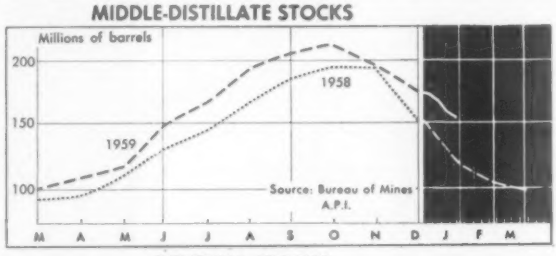
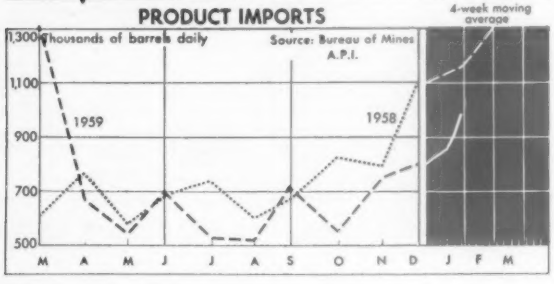


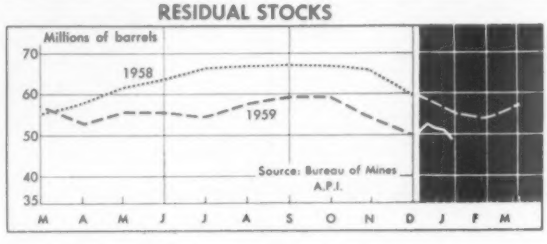












API REFINERY REPORT—JANUARY 29, 1960

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1959 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,112	492.1	33.3	315.8	168.9	41,268	10,975	46,837	12,154	1,195	550.9	45.4	416.3	225.8
Appalachian:														
District 1 ...	103	40.6	1.4	22.9	16.1	5,967	673	3,397	319	97	39.7	6.5	21.5	11.9
District 2 ...	105	53.9	7.8	20.9	15.0	3,119	432	1,448	376	114	57.4	7.3	20.0	18.6
Ind., Ill., Ky...	1,519	761.1	71.3	351.3	200.3	36,697	5,028	21,644	5,140	1,512	738.9	80.0	359.6	223.2
Minn., Wis., Dak.	123	60.4	6.7	22.9	23.1	7,448	976	5,614	631	108	52.4	6.4	28.4	14.6
Okla., Kans., Mo.	754	409.9	15.6	194.6	34.3	19,380	1,068	10,507	998	770	416.0	22.7	210.0	40.8
Inland Texas ..	281	198.6	9.6	43.9	20.7	7,936	394	1,422	2,438	278	183.9	8.8	48.3	21.7
Tex. Gulf Coast	1,920	938.9	107.0	506.7	138.7	26,478	2,229	13,501	4,949	1,961	979.2	142.9	564.9	182.2
La. Gulf Coast.	680	357.1	81.6	146.3	53.7	12,183	1,980	5,572	1,178	699	343.6	81.2	184.5	50.4
N. La. and Ark.	115	47.3	7.3	22.7	9.6	5,759	636	2,275	182	92	45.3	5.8	19.1	5.8
Rocky Mountain:														
New Mexico.	26	14.6	0.7	5.1	2.6	915	55	178	106	24	11.3	0.6	4.6	2.4
Other Rky. Mt.	298	148.4	3.3	71.8	34.7	6,729	173	2,302	1,080	287	136.4	4.2	62.8	37.5
West Coast	1,113	415.7	1.3	213.7	265.7	29,305	406	11,788	18,378	1,093	502.5	6.9	193.0	281.9
Jan. 29, 1960	8,149	3,938.6	346.9	1,938.6	983.4	203,184	25,025	126,485	47,929	8,230	4,057.5	418.7	2,133.0	1,116.8
Jan. 22, 1960	8,227	4,107.6	420.4	1,949.1	942.3	199,905	25,866	132,638	50,089	.....	.....	.....	.....	.....
Jan. 30, 1959	8,140	3,930.6	422.4	2,138.9	1,085.7	197,511	20,910	96,745	57,867	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Group 3 gasoline up; Shell cuts price on Montana area crude

GASOLINE prices on the Mid-Continent spot market were advanced ¼ cent last week by principal suppliers.

The published price thus went up to 10 or 10.5 cents a gallon for regular and 12.5 to 13 cents for premium.

The advance, however, was more in the nature of a statistical maneuver since the market won't receive any substantial test until spring. Suppliers felt the higher prices were justified in view of cleanup deals occurring late in January and were almost necessary if refiners are to avoid continued losses at depressed levels.

Heating oils began to weaken noticeably late last week. No. 2 was off one-fourth cent on the Gulf and East Coasts and was being discounted in the Mid-Continent. Other middle distillates, except kerosine, shared the same experience.

Continued warm weather at the start of February contributed to the market uneasiness. This was accentuated by reports that a slug totaling 253,000 bbl. of No. 2 was stranded in the Little Big Inch near Chicago without a home. This prompted operators of the pipeline to shut down the pumps on the branch line from Seymour, Ind., to Chicago.

Some marketers who have tried valiantly to hold the price line on heating oils predict an average year yet for heating-oil dealers in spite of the current warm weather in many areas.

Cut in crude. Shell Oil Co. has cut its price postings 15 cents a barrel on crude it buys in eastern Montana, southwestern North Dakota, and northeastern South Dakota.

The new postings affect about 30,000 bbl. of crude with all but 1,000 bbl. located in eastern Montana. Under the new schedule, Shell will pay a top of $2.485 for 40°-44.9°-gravity crude in Glendive field and a low of $2.065 for crude below 20° gravity.

There are 11 other fields in Montana affected by the cut. They include Cabin Creek, Cupton, Fertile Prairie, Gas City, Little Beaver, Little Beaver East, Pennel, Pine, Repeat, Wills Creek, and Yellowstone.

Little Missouri-Red River in North Dakota also is covered by the price cut along with Buffalo in South Dakota. The new postings for these fields incllude high of $2.55 for 40°-44.9°-gravity crude and $2.13 for below 20°-gravity.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Okla-homa	Gulf Coast Tex.*	West Tex.† N.M.	Wyo. (sour)
14-14.9	$1.76	....	....	....	....
15-15.9	1.84	....	....	....	$1.81
16-16.9	1.92	....	....	....	1.86
17-17.9	2.00	....	....	....	1.91
18-18.9	2.08	....	....	....	1.96
19-19.9	2.16	....	....	....	2.01
20-20.9	2.24	$2.49	....	$2.35	2.06
21-21.9	2.32	2.52	....	2.38	2.11
22-22.9	2.39	2.55	....	2.41	2.16
23-23.9	2.46	2.58	$3.44	2.44	2.21
24-24.9	2.53	2.61	3.46	2.47	2.26
25-25.9	2.60	2.64	3.48	2.50	2.31
26-26.9	2.67	2.67	3.50	2.53	2.36
27-27.9	2.74	2.70	3.52	2.56	2.49
28-28.9	2.81	2.73	3.54	2.59	2.54
29-29.9	2.87	2.76	3.56	2.62	2.59
30-30.9	2.93	2.79	....	2.65	2.63
31-31.9	3.00	2.82	....	2.68	2.67
32-32.9	3.06	2.85	....	2.71	2.71
33-33.9	3.12	2.88	....	2.74	2.75
34-34.9	3.17	2.91	....	2.77	2.79
35-35.9	3.22	2.94	....	2.80	2.83
36-36.9	3.27	2.97	....	2.83	2.87
37-37.9	3.31	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Low cold test crude. †Sour.

Effective dates of broad changes: California, 9-11-59; East of California, January 3-10, 1957; Pennsylvania Grade 1-11-60.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.23-3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.55
Middle District	4.37
Southwest Pennsylvania	4.10
West Virginia	3.92
Buckeye Grade	3.97
Illinois Basin	**3.00**

FOREIGN

Canada:	
Leduc-Woodbend	2.53
Redwater (Alta.)	2.42
Smiley (Sask.)	2.18
Pembina	2.38
Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.34
San Joaquin, 41°-41.9°, Puerto La Cruz	3.08-3.10
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

***Also available at La Salina at 3 cents per barrel less.**

Middle East, Persian Gulf (cargoes f.o.b. lifting port):	
Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.80
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05
Middle East, E. Mediterranean:	
Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.57

Refined-Product Prices

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
★ Regular (91 octane)	10.00-10.50
★ Premium (99 octane)	12.50-13.00
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.25-10.50
Regular (92 octane)	10.50-10.75
Premium (98 octane)	11.75-12.00
California (rack) Los Angeles):	
Regular (88 octane)	11.65-12.15
Premium (94 octane)	12.65-13.15
Premium (100 octane)	14.00-14.65
Caribbean area (cargoes):	
Regular (87 octane)	10.125
Premium (97 octane)	11.75

***Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.**

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	10.25-10.50
Diesel oil (58 d.i. and above)	10.00
Distillate No. 1	10.00-10.25
Distillate No. 2	9.25
Gulf Coast (cargoes):	
Kerosine 41-43	9.50
★ Distillate No. 2	8.375
New York Harbor (barges):	
Kerosine 41-43	11.10
Distillate No. 2	10.1
Diesel fuel, 48-52 d.i.	10.40
Caribbean area (cargoes):	
Distillate No. 2	8.375-8.625

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max 1% S)	$1.80-1.90
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.37
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.15

Tanker Rates (Long Ton)

(Latest reported spot fixtures)

★ Gulf-USNH, clean (ATRS—15%)	$2.42
★ Carib.-UK, clean (Scale—31.25%) (22s. 4d.)	3.13
★ PG-Japan, dirty (USMC—65%)	3.57
★ PG-UK, dirty (Scale—46.5%) (31s. 10d.)	4.46

★ Denotes change from previous week.

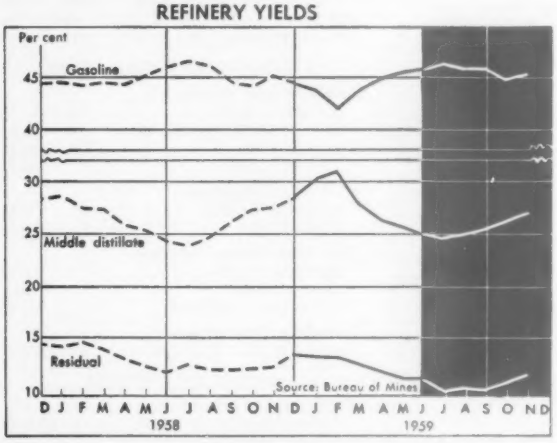
SUPPLY AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

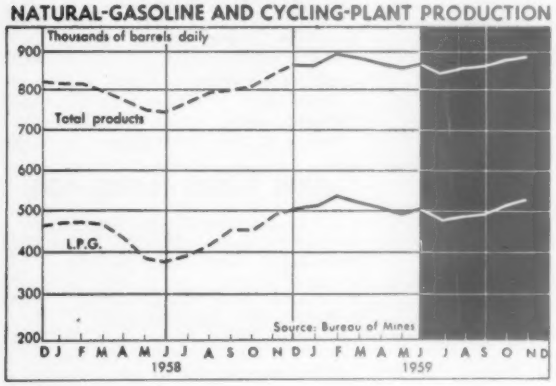
	Total demand	Refinery production	Stocks end of period†
GASOLINE			
January 1960*	3,540	3,950	204,000
December 1959*	3,990	4,160	188,970
November 1959	3,920	4,095	181,016
February 1959	3,623	3,939	210,370
January 1959	3,751	4,146	186,760
KEROSINE			
January 1960*	550	370	25,000
December 1959*	525	390	26,770
November 1959	393	333	30,701
February 1959	469	417	19,730
January 1959	583	419	21,090
DISTILLATE			
January 1960*	2,720	1,890	126,000
December 1959*	2,585	1,925	148,800
November 1959	2,225	1,835	171,114
February 1959	2,678	2,159	84,070
January 1959	3,113	2,133	96,849
RESIDUAL			
January 1960*	1,910	960	47,000
December 1959*	1,830	995	49,940
November 1959	1,717	972	58,587
February 1959	2,135	1,125	54,180
January 1959	2,135	1,117	55,214

*Preliminary. †Thousands of barrels.

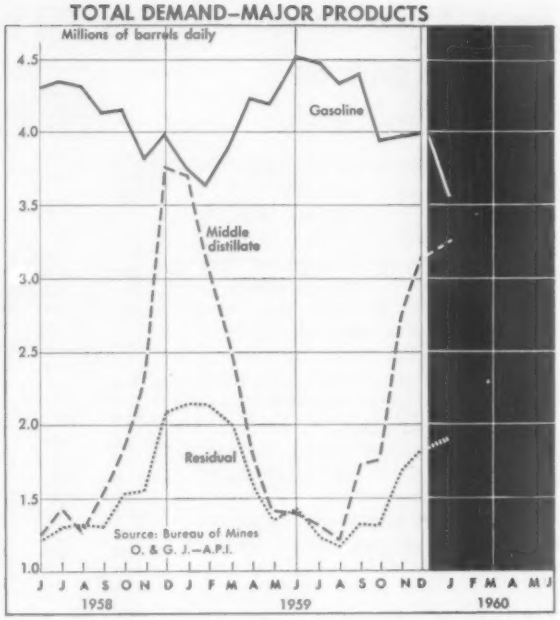
REFINERY YIELDS



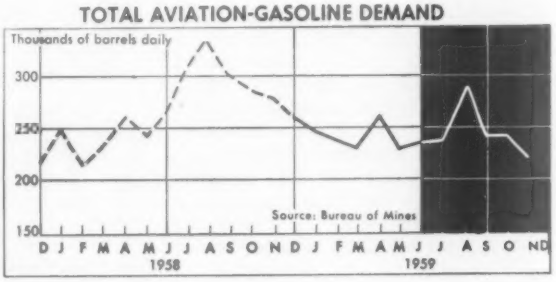
NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



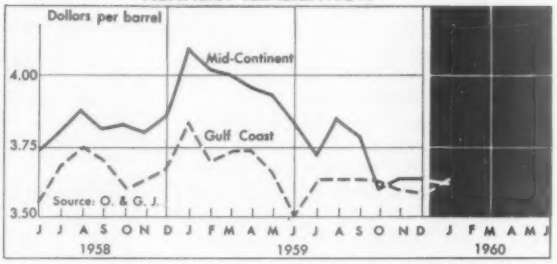
TOTAL DEMAND–MAJOR PRODUCTS



TOTAL AVIATION-GASOLINE DEMAND



REFINERY REALIZATION



REFINERY REALIZATION

	Jan.* 1960	Dec.* 1959	Nov. 1959	Jan. 1959
Mid-Continent	$3.62	$3.63	$3.60	$4.09
Gulf Coast	3.64	3.58	3.63	3.83

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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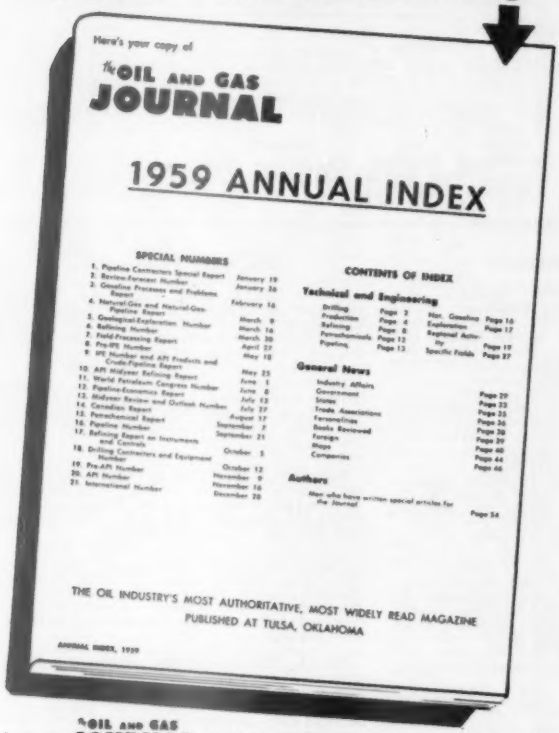

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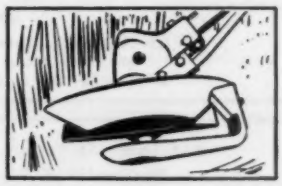

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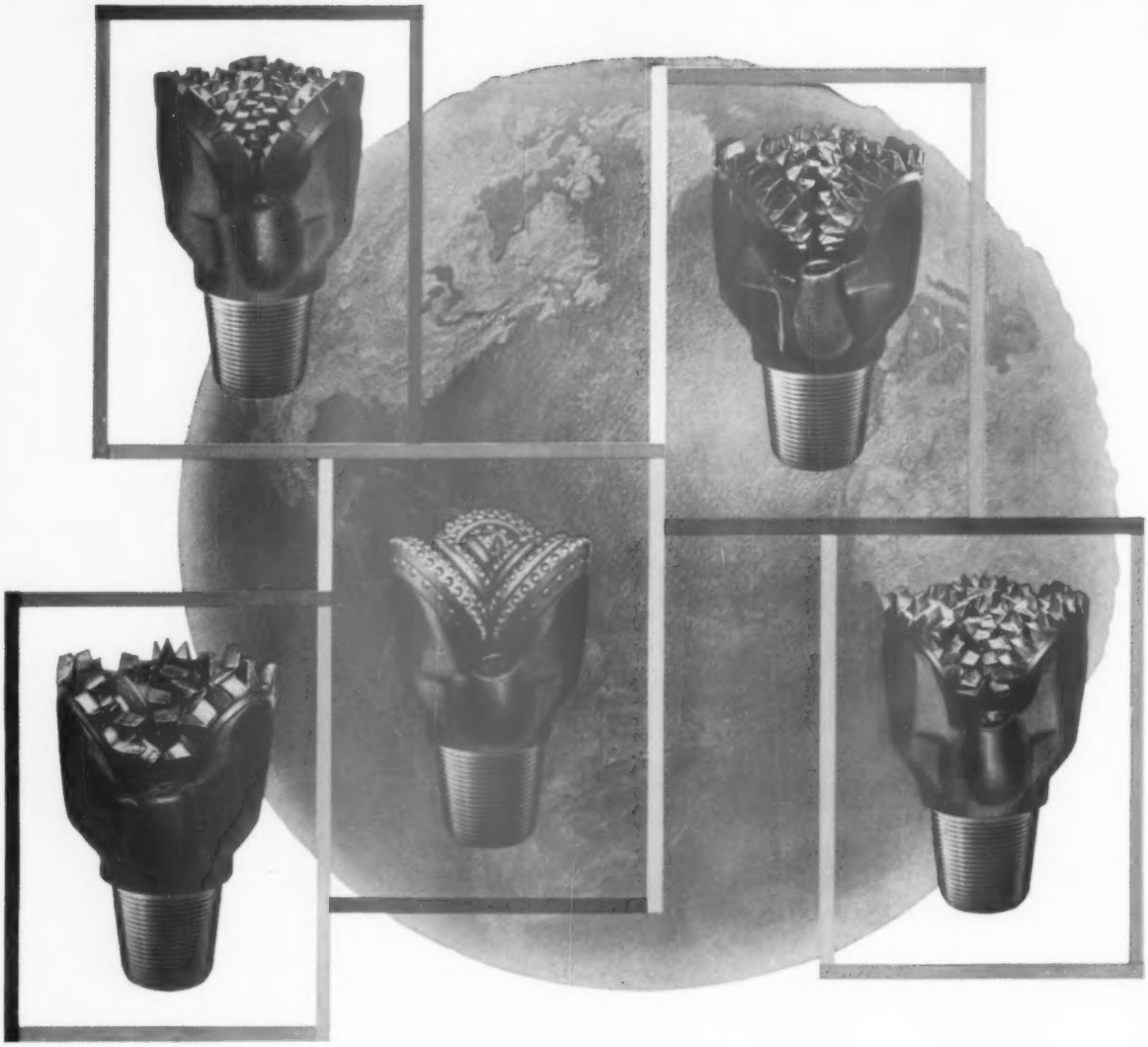

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